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Final

Muni Metro Turnaround Project

FINAL ENVIRONMENTAL IMPACT STATEMENT

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US Department
of Transportation
**Urban Mass
Transportation
Administration**

Western Area Office

211 Main Street
Room 1160
San Francisco, California 94105

AU [illegible] 89

Dear Sir:

The Urban Mass Transportation Administration (UMTA) in cooperation with the City and County of San Francisco, acting through the San Francisco Public Utilities Commission (SFPUC), has prepared the enclosed Final Environmental Impact Statement (FEIS) for the Muni Metro Turnaround Facilities project.

In August 1988, UMTA published a Draft Environmental Impact Statement (DEIS) for this project which considered four alternatives. Construction and operation of both a surface and an underground alternative for turning back MUNI light rail vehicles at the Market Street terminal point were considered, along with No Action and Transportation Systems Management alternatives. On October 25, 1988, the SFPUC chose the underground project as the preferred alternative. This FEIS is a revision to the DEIS and therefore contains information on all four alternatives presented in the DEIS. New sections have been added on choice of the preferred alternative, comments received on the DEIS and responses to those comments, and detailed mitigation measures for the chosen alternative. Text revised from the original DEIS is marked by a bar line in the right hand margin.

This document is being sent to appropriate Federal, State and local agencies, as well as to all those who commented on or received the DEIS. UMTA will wait a minimum of thirty days, ending on September 24, 1989, before reaching a decision on whether to provide financial assistance for this project.

Sincerely,

Brigid Hynes-Cherin

Brigid Hynes-Cherin
Western Area Director

U. S. DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION AND
CITY AND COUNTY OF SAN FRANCISCO

FINAL ENVIRONMENTAL IMPACT STATEMENT

MUNI METRO TURNAROUND FACILITIIES

Submitted pursuant to Section 103(2)(c) of the National Environmental Policy Act of 1969; Sections 3(d) and 14 of the Urban Mass Transportation Act of 1964, as amended; Section 106 of the National Historic Preservation Act of 1966; and Section 4(f) of the Department of Transportation Act of 1966.

8/14/89
Date

Brigid Hynes-Cherin
Brigid Hynes-Cherin
Western Area Director
Urban Mass Transportation Administion

8/14/89
Date

Merrill Cohn
Merrill Cohn, Project Manager
City and County of San Francisco

Muni Metro Turnaround Project

FINAL ENVIRONMENTAL IMPACT STATEMENT

DEPARTMENT OF TRANSPORTATION
URBAN MASS TRANSPORTATION ADMINISTRATION

SAN FRANCISCO MUNICIPAL RAILWAY
SAN FRANCISCO PUBLIC UTILITIES COMMISSION

August, 1989

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project : final
1989.

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The LEAD AGENCY for the MUNI Metro Turnaround Project Environmental Impact Statement is the URBAN MASS TRANSPORTATION ADMINISTRATION. The COOPERATING AGENCY is the CITY AND COUNTY OF SAN FRANCISCO.

Abstract

The Turnaround Project Study Area is located in San Francisco along The Embarcadero from Clay Street to Brannon, with Davis and Beale serving as the western project boundaries. The project involves improving the turnback operation of the MUNI Metro System at the eastern terminus of the Market Street subway. The alternatives to be studied are as follows:

1. Surface Alternative: MUNI Metro turnback operation would occur at two surface locations between Howard and Bryant in the median of the Embarcadero Parkway. Portal would be located north of Howard Street.
2. Underground Alternative: Turnback operations would occur exclusively underground in a tunnel below the Embarcadero Parkway. Portal and storage track would be located immediately south of Howard Street.
3. Transportation System Management Alternative: The existing turnback facility at the Embarcadero Station would be retained. Operational improvements related to faster train movements in the Market Street subway would be implemented.
4. No Action Alternative: No change to the existing MUNI Metro facilities or system operation.

Impacts to adjacent land uses, parklands, historical resources, traffic and transportation along The Embarcadero and existing structures are examined. Additionally, noise, dust, vibration, visual, and other construction and operation impacts are studied. An economic analysis for the Turnaround Project alternatives is provided.

The information in the Environmental Impact Statement is utilized by local decision makers to choose the preferred alternative.

The following persons may be contacted for additional information concerning this document:

UMTA REGION	CITY OF SAN FRANCISCO
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PREFACE

The MUNI Metro Turnaround Project Final Environmental Impact Statement (FEIS), in accordance with Department of Transportation Rules and Regulations stipulated in Volume 52, Number 167 of the Federal Register (August 28, 1987), identifies and describes the locally preferred alternative, the Underground Alternative (Alt. #2), selected by the San Francisco Public Utilities Commission.

Additionally, the FEIS contains revisions to the Draft EIS published in August, 1988, incorporating the Responses to Comments received during the public review period which terminated on October 10, 1989. Text revised from the original DEIS is marked by a bar line in the right hand margin. The FEIS identifies the four alternatives examined, Surface, Underground, Transportation System Management, and No Project, and summarizes their respective descriptions, costs, environmental effects, and ability to meet Year 2007 Transportation Goals. The rationale for choosing the locally preferred alternative is provided and is based on this comparative information.

The Final EIS is divided into nine chapters, preceded by a summary of project alternatives, potential significant impacts, costs, and rationale for choosing the locally preferred alternative. The chapters are:

1. Background Purpose and Need: includes the rationale for selecting the Underground Alternative, comprising a description of the background and purpose and need of the Turnaround Project, project goals, the alternatives evaluated, and the environmental review process.

2. Description of the Project Alternatives: includes capital and operating cost information.

3. Description of the Affected Environment.

4. Environmental Consequences and Proposed Mitigation: for each Project Alternative.

5. Evaluation of Alternatives: includes the rationale for selecting the Underground Alternative as the locally preferred alternative.

6. Committed Mitigation Measures for the Locally Preferred Alternative.

7. Summary of Comments on the Draft EIS: includes an index and a cross-reference system that identifies each issue in the comment that requires a response.

8. Responses to the Comments on the Draft EIS.

9. References and Agency Contacts.

Citations in the text refer to sources identified in Chapter 9, References/ Agency Contacts.

The following appendices are also provided:

A. List of Preparers

B. List of Recipients of the Draft EIS

C. Reference Documents
(Available for Inspection at the Public Utilities Commission Utilities Engineering Bureau, 1155 Market Street, San Francisco.)

D. City Planning Commission Recommendation

E. Public Utilities Commission Resolution

F. Memorandum of Agreement, Historic and Cultural Resource Plan

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B. LIST OF RECIPIENTS OF THE DRAFT EIS

C. REFERENCE DOCUMENTS
(Available for Inspection at the Public Utilities Commission
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1. OPERATIONS SUMMARY REPORT

2. FINAL ENGINEERING REPORT
JUNE 10, 1988; B-263

3. GEOTECHNICAL REPORT

4. SCOPING REPORT

5. MUNI METRO TURNAROUND
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9. SAN FRANCISCO MUNICIPAL RAILWAY METRO
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10. SAN FRANCISCO MUNICIPAL RAILWAY METRO TURNAROUND PROJECT HISTORICAL AND CULTURAL RESEARCH TO 1887

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SUMMARY

S.1 PROJECT PURPOSE AND NEED

S.1.1 PROJECT OBJECTIVES

The MUNI Metro System must be capable of carrying the expected growth in patronage over the next 20 years. This growth has been estimated by the City of San Francisco to be 12 percent. Thus, the two hour P.M. peak load at Van Ness is expected to increase from the existing (1986) 11,800 passengers to a high range of 13,400 passengers by 2007 (Bechtel, 1987G).

The operating plan and schedule prepared by Manuel Padron (Padron and Associates, 1987) to meet projected demand requires the number of trains to be increased from 20 (1987 schedule) to 30 per hour. Thus, the headway decreases from 3 to 2 minutes.

Operation simulations by the George Beetle Company indicate that the present terminal layout can not handle the increased number of trains. The eastbound (inbound) trains back up from the Embarcadero crossover all the way to Van Ness Station (George Beetle Company, 1987).

Although there are other improvements, such as Transportation Systems Management measures, which could provide slight increases in peak hour capacity to help meet this growth in patronage, sufficient improvements can not be implemented within the 20 year period to accommodate the anticipated growth in ridership. Thus, the construction of new turnback facilities is being considered.

The purpose of the project is to provide a more efficient turnback track configuration that will handle the 20 year growth in traffic. The build alternatives would also provide the opportunity for future connection of a southern extension of MUNI Metro to Mission Bay. Project objectives are:

- Provide additional capacity (30 trains per hour) to accommodate the growth in ridership on the existing Metro system as forecast by the City for the year 2007.
- Provide the opportunity to reduce coupling of trains at West Portal and Duboce Portal, thus reducing passenger delays and operating expenses.
- Improve operating reliability by nominal cost changes to the vehicles and signal system, as described in the Transportation Systems Management (TSM) alternative.
- Provide side tracks to turnback a significant portion of the trains off the mainline tracks, thus providing an opportunity for a direct connection to a future Metro extension to the south.
- Minimize impacts to the surrounding land uses; conform with City policy and Waterfront plans.
- Be acceptable to the community.

S.1.2 TURNAROUND PROJECT AS AN ELEMENT OF WATERFRONT TRANSPORTATION

The Turnaround Project is also an element of Waterfront transportation projects to improve circulation along the Northeastern Waterfront and in the Rincon Point/South Beach and China Basin areas. The other related transportation projects are:

- Embarcadero Parkway
- I-280 on and off-ramp redesign
- MUNI Metro Extension to Mission Bay
- F-line streetcar service along Market Street and The Embarcadero to Fisherman's Wharf

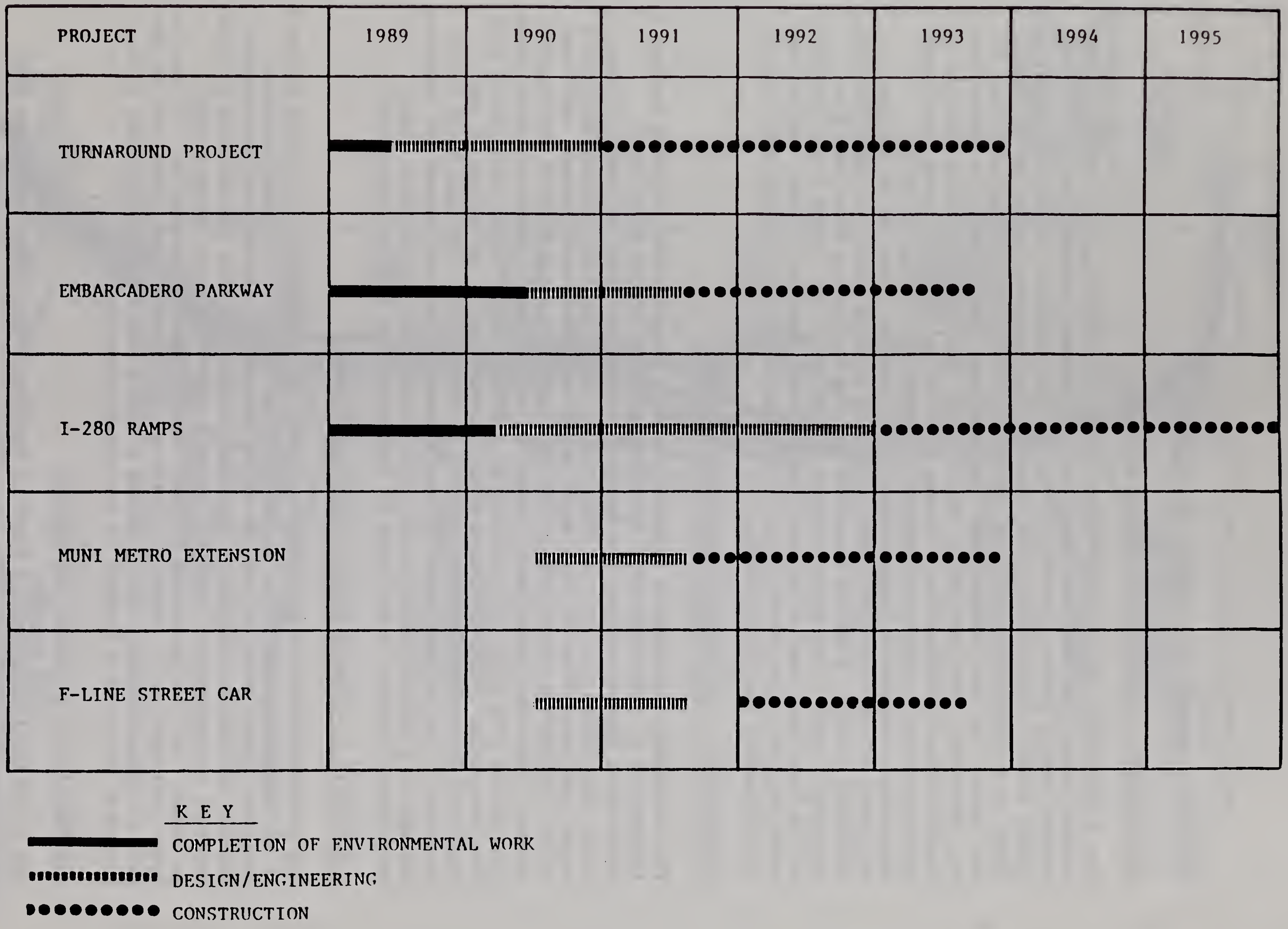
The Waterfront transportation projects are described as integral elements of the I-280 Transfer Concept Program and EIR (1984) the South of Market Plan (1988) and Mission Bay Draft Environmental Impact Report (1988). Trip generation and MUNI capacity statistics utilized in these documents assume that both the Turnaround Project and MUNI Metro Extension to Mission Bay are in place by Year 2000. Earlier documents such as the Rincon Hill Final Environmental Impact Report (1984), the Downtown Plan and EIR (1984) and the Rincon Point/South Beach Redevelopment Plan (1980, 1984) also cite the need for the MUNI Metro Extension and Embarcadero Parkway project.

The Embarcadero Parkway is the key element in the plans for circulation improvements along the Waterfront. Redesign of the Embarcadero Roadway into a treelined parkway will offer the opportunity to construct surface rail along the right-of-way, to enhance the Waterfront environment, and to facilitate traffic movement along the Waterfront to the I-280 freeway via King Street, which will also be redesigned as part of the Parkway project. The realignment of The Embarcadero could permit Justin Herman Plaza to be enlarged and allow for the creation of a Waterfront park at Rincon Point.

The Parkway Project, administered by the San Francisco Department of Public Works, would include funding for displacement of existing land uses between Howard and Folsom east of Steuart Street; for removal and replacement of affected Belt Line track; for mitigating access-related construction impacts; and for streetscape, signalization, and intersection improvements. Additional funding is programmed as part of the Embarcadero Parkway Project to remove the stub end of the I-280 freeway between Third and Sixth Streets and to construct new on- and off-ramps linking I-280 with King Boulevard.

The proposed MUNI Metro Extension, funded and managed through PUC capital grants, would follow the median of the Embarcadero Parkway south to Sixth and King, and allow sufficient space to construct high level inbound and outbound loading platforms at four locations along this alignment.

The Turnaround Project construction schedule ultimately affects each of the Waterfront projects since the Turnaround has the longest construction requirements and disrupts an area where all waterfront transportation projects, except the I-280 ramps, coincide. Figure S.1-1 illustrates the timing for preparation of environmental documents (including public participation), completion of design and engineering work and the period of construction for the Waterfront project.


PROJECT
1989
1990
1991
1992
1993
1994
1995
TURNAROUND PROJECT
EMBARCADERO PARKWAY
I-280 RAMPS
MUNI METRO EXTENSION
F-LINE STREET CAR
K E Y
COMPLETION OF ENVIRONMENTAL WORK
DESIGN/ENGINEERING
CONSTRUCTION

S.2 SUMMARY OF ALTERNATIVES CONSIDERED

ALTERNATIVE 1 - EMBARCADERO SURFACE ALIGNMENT

The construction for the Embarcadero Surface Alternative would begin at the eastern end of the Embarcadero Station and proceed northeast in twin tunnels beneath Market Street, generally over the BART tunnels, to Steuart Street (see Figure S.2-1). The tunnels would curve to the southeast under Justin Herman Plaza to a ventilation structure under the Embarcadero Roadway and clear of the Plaza. The main tracks would then continue southeasterly in subway open cut structure, then curve under the elevated Embarcadero Freeway near the Mission Street intersection. Between Mission and Howard Streets, the tracks would ascend to a portal and surface alignment in the median of the Embarcadero Roadway at Howard Street. The surface tracks would continue southeast in The Embarcadero median through reverse curves to the north line of Folsom Street. A center track for turning a four-car train would be provided in this block between Howard and Folsom. The tracks would continue in The Embarcadero median across Folsom Street, Harrison Street, and to the north side of Bryant Street. In the last block the main tracks would spread to accommodate two center tracks.

ALTERNATIVE 2 - EMBARCADERO UNDERGROUND ALIGNMENT

The Embarcadero Underground Alternative would have a tunnel section similar to Alternative 1, continuing from the existing Spear Street Shaft to a ventilation structure under the Embarcadero Roadway clear of Justin Herman Plaza (see Figure S.2-2). The main tracks would continue southeasterly in a subway open cut structure then curve under the Embarcadero Freeway and close to the westerly property line of The Embarcadero between Mission and Howard Streets. The main tracks would spread to accommodate a center turnback track with access from both ends followed by a second center track with access only from the north. The main tracks would then ascend to the median of the realigned Embarcadero Parkway south of Howard Street. One main track would continue on the surface across Folsom Street and 330 feet beyond for temporary storage of a 4-car disabled train. All turnback movements would occur underground; surface track would be less extensive than in Alternative 1.

ALTERNATIVE 3 - TRANSPORTATION SYSTEMS MANAGEMENT

The Transportation Systems Management (TSM) Alternative is a low cost approach to addressing transportation problems in the corridor. It would provide a baseline against which all of the major investment alternatives are measured. The TSM Alternative represents the best that can be done for mobility with the existing infrastructure, that is, without construction of a new transit guideway. For the Turnaround Project, the TSM measures would be: 1) vehicle brake modification, 2) controlling the train reversing mechanism from the end car, 3) signal changes, and 4) adding a fourth speed code which would allow trains to travel more quickly in the Market Street subway.

ALTERNATIVE 4 - NO-ACTION ALTERNATIVE

The No-action Alternative is based on existing conditions with no new MUNI facilities nor changes to Metro operation.

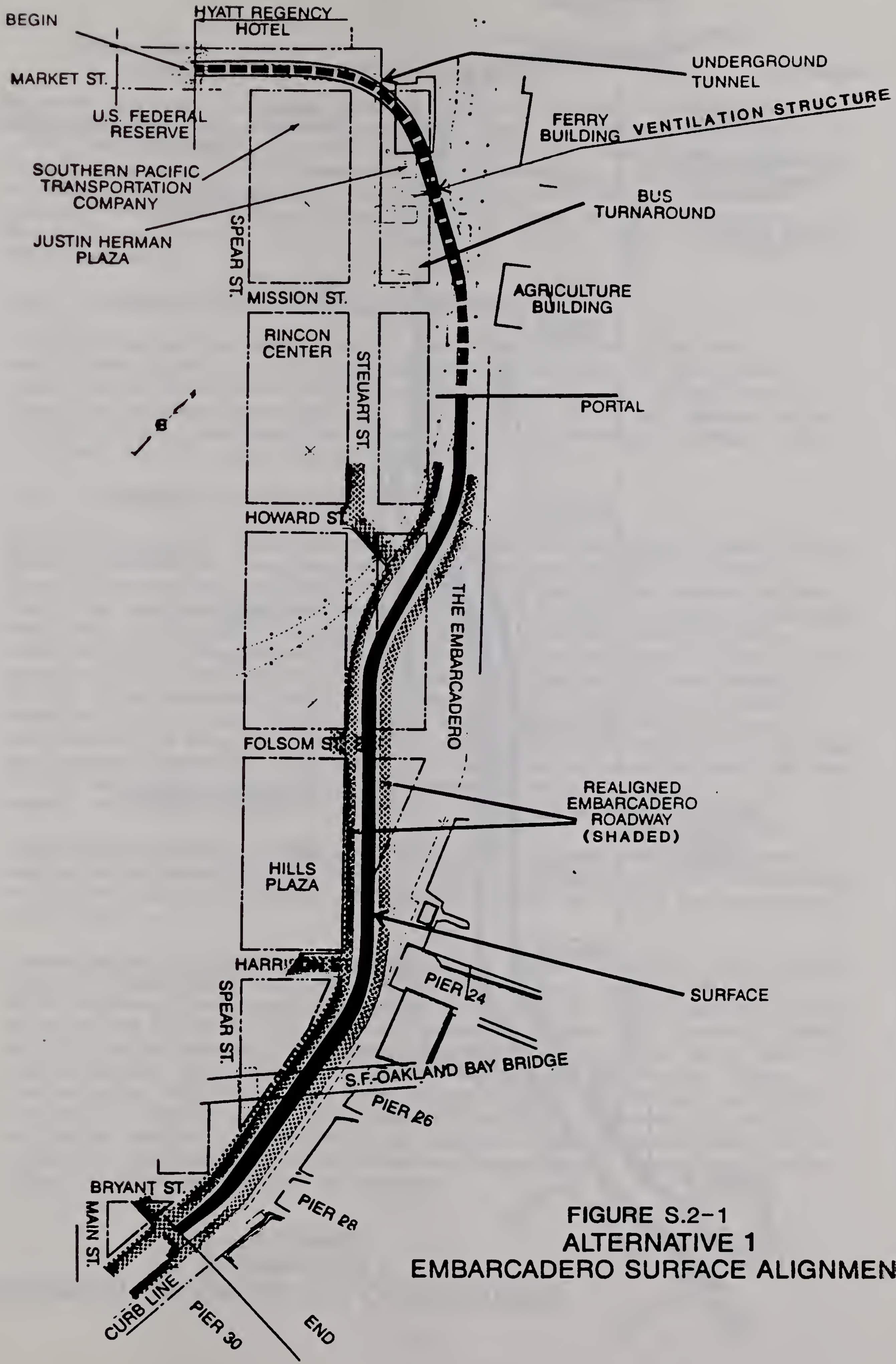

BEGIN
HYATT REGENCY HOTEL
MARKET ST.
U.S. FEDERAL RESERVE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
UNDERGROUND TUNNEL
FERRY BUILDING
VENTILATION STRUCTURE
BUS TURNAROUND
SPEAR ST.
MISSION ST.
AGRICULTURE BUILDING
RINCON CENTER
STEUART ST.
PORTAL
HOWARD ST.
THE EMBARCADERO
FOLSOM ST.
REALIGNED EMBARCADERO ROADWAY (SHADED)
HILLS PLAZA
HARRISON
SURFACE
PIER 24
SPEAR ST.
S.F.-OAKLAND BAY BRIDGE
PIER 26
BRYANT ST.
MAIN ST.
PIER 28
CURB LINE
PIER 30
END

FIGURE S.2-1
ALTERNATIVE 1
EMBARCADERO SURFACE ALIGNMENT

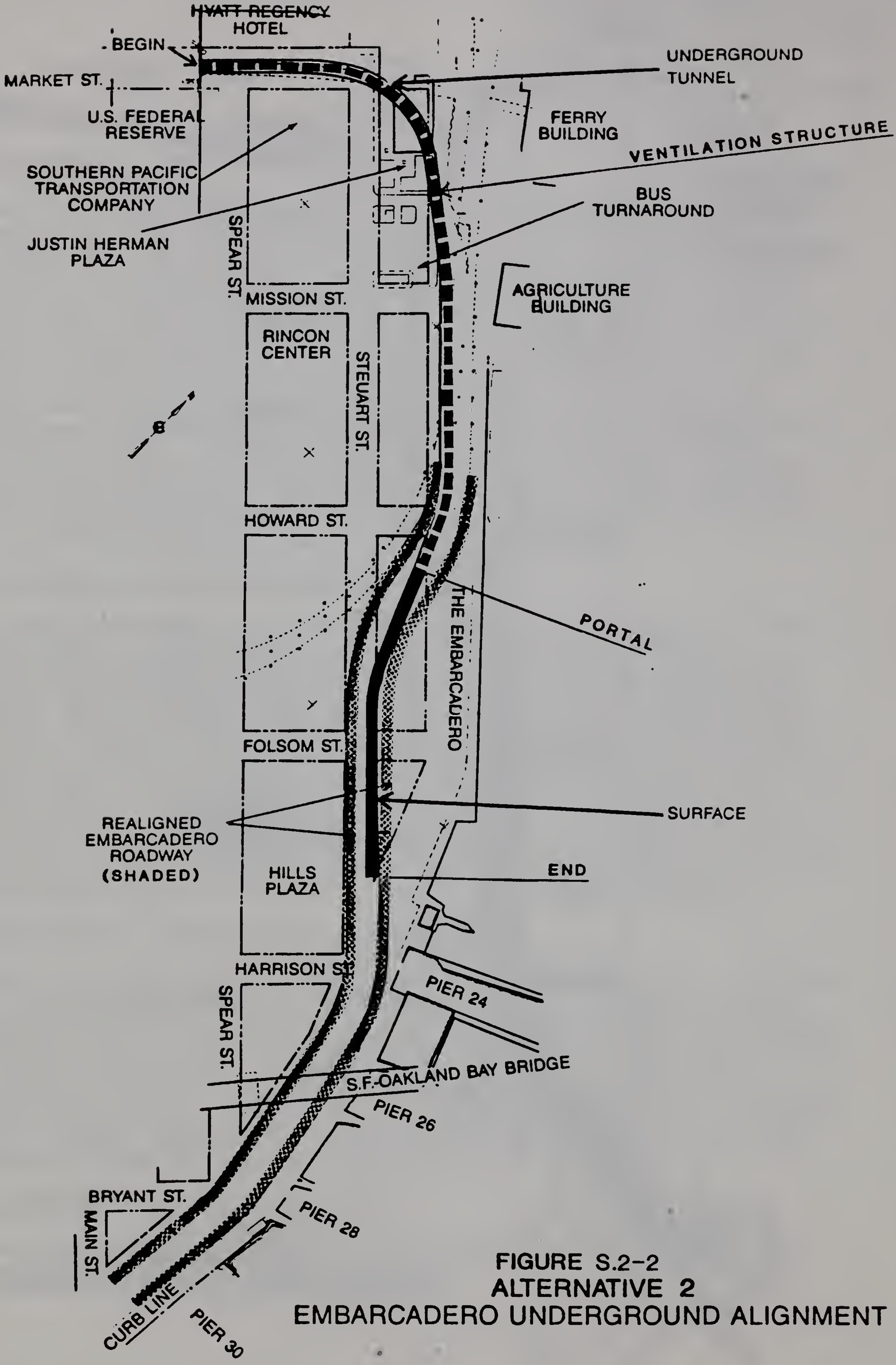

HYATT REGENCY HOTEL
BEGIN
MARKET ST.
U.S. FEDERAL RESERVE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
UNDERGROUND TUNNEL
FERRY BUILDING
VENTILATION STRUCTURE
BUS TURNAROUND
AGRICULTURE BUILDING
SPEAR ST.
MISSION ST.
RINCON CENTER
STEUART ST.
HOWARD ST.
THE EMBARCADERO
PORTAL
FOLSOM ST.
SURFACE
REALIGNED EMBARCADERO ROADWAY (SHADED)
HILLS PLAZA
END
HARRISON ST.
SPEAR ST.
PIER 24
S.F.-OAKLAND BAY BRIDGE
PIER 26
BRYANT ST.
MAIN ST.
PIER 28
CURB LINE
PIER 30

FIGURE S.2-2
ALTERNATIVE 2
EMBARCADERO UNDERGROUND ALIGNMENT

As shown in Figure S.2-3, the existing MUNI Metro Market Street subway line ends at the east end of the Embarcadero Station. The present track layout is a two track stub with a crossover located immediately west of the station to reverse direction of the trains. The crossover is signaled for 27 mph, although eastbound trains must immediately slow to 10 mph to enter the station. The present layout allows 20 to 22 trains per hour traveling in the Market Street subway, significantly less than required to meet 20 year projected demand.

S.3 SUMMARY OF POTENTIAL SIGNIFICANT IMPACTS

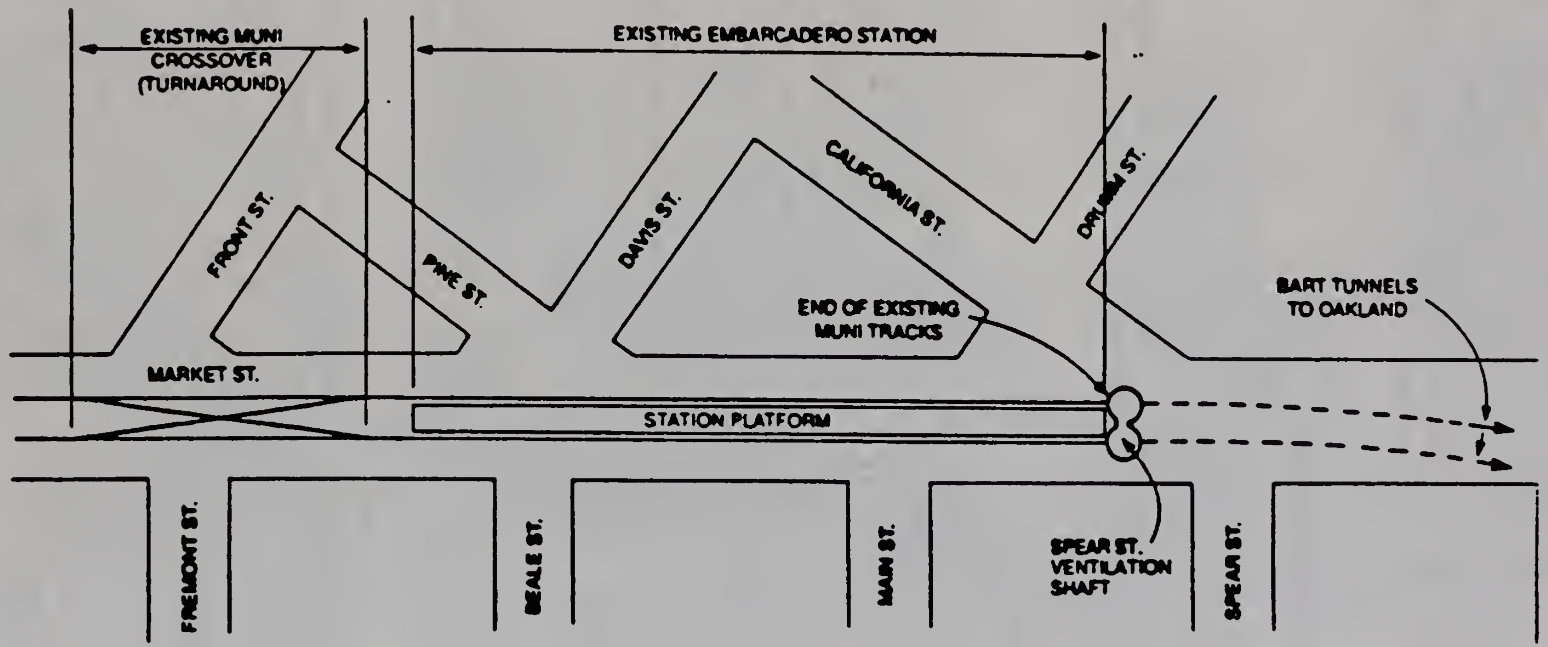
The following section summarizes the most significant mitigated and unmitigated impacts for each Turnaround Project alternative, particularly those that differentiate alternatives. Short term impacts define those created by construction of the build alternatives. Long term impacts relate to those effects resulting from operation of the Turnaround Project. Table S.3 lists impact by environmental category.

S.3.1 UNMITIGATED SIGNIFICANT IMPACTS

Surface Alternative. This alternative would create unmitigated visual impacts during construction. Long term unmitigated impacts include (1) traffic impacts, particularly at Mission/Embarcadero, related to the closure of the Howard and Harrison intersections at Embarcadero to left turning traffic under the Surface Alternative; (2) increased risk of accidents involving Metro vehicles at all intersections that would have either pedestrian and/or vehicle cross traffic as required under the Surface Alternative; (3) the incompatibility of the Advanced Train Control System (ATCS) with surface turnback operation; and (4) the violation of the eight hour CO standards at the intersections of Mission and Folsom with Embarcadero will be exacerbated under the Surface Alternative. Additionally, the Surface Alternative would not meet project objectives related to community acceptance, minimizing land use impacts and conforming with existing City plans and policies.

Underground Alternative. This alternative would create unmitigated visual impacts during construction. However, the Underground Alternative produces no unmitigated long term effects. All project objectives can be met under this alternative.

Transportation System Management Alternative. Although no short term effects would be created under this alternative, none of the project objectives, except improving Metro operating reliability, could be accomplished by solely employing TSM measures. The goal of accommodating Year 2007 ridership demand could not be met and would force potential Metro riders to use other forms of transportation. Since the use of private autos would be the most likely alternative to MUNI Metro, long term impacts related to deteriorated traffic circulation, reduced intersection Level of Service, diminished air quality, and lack of available parking could be expected. These impacts could not be mitigated. Additionally, by not accommodating projected demand, the City's Transit First policy would be undermined.


EXISTING MUNI CROSSOVER (TURNAROUND)
EXISTING EMBARCADERO STATION
FRONT ST.
PINE ST.
DAVIS ST.
CALIFORNIA ST.
DRUMM ST.
END OF EXISTING MUNI TRACKS
BART TUNNELS TO OAKLAND
MARKET ST.
STATION PLATFORM
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST. VENTILATION SHAFT
SPEAR ST.

SOURCE: BECHTEL NATIONAL, INC.

earth metrics

SCALE

FIGURE S.2-3 ALTERNATIVE 3 AND 4 TRANSPORTATION SYSTEMS MANAGEMENT AND NO ACTION

No Project Alternative. The No Project Alternative would create long term, unmitigated effects similar to those described in the TSM Alternative. However, since the No Project Alternative would not provide Metro capacity or operating reliability improvements, the traffic and air quality problems resulting from unmet MUNI demand would exceed those associated with the TSM Alternative.

S.3.2 SURFACE ALTERNATIVE

Short Term. Construction would extend south to Bryant Street disrupting traffic and pedestrian circulation at three intersections, Folsom/Embarcadero, Harrison/Embarcadero, and Bryant/Embarcadero, that would not be affected by the other build alternative. The cut and cover excavation would require support and stabilization for the Embarcadero Freeway piers. It would also displace 120 Port of San Francisco parking spaces for up to 36 months. Major telecommunication vaults lie in the path of the portal structure; relocation may be costly.

Long Term. Both the Surface and Underground Alternatives provide the operational capability of running 30 trains per hour in the Market Street subway thus accommodating projected 20 year demand. However, with the Surface Alternative, two surface turnback areas create visual and noise intrusions on the surrounding land uses, particularly at the future Rincon Point waterfront park and the Bayfront Promenade. Surface turnback operation, which requires a broadened roadway south of Harrison Street, would disrupt pedestrian flow across The Embarcadero, impede access to Piers 24, 26, and 28, and detract from the waterfront environment and activities. Queuing of traffic at signalized intersections preempted in favor of MUNI Metro could also occur. Because of the portal location immediately north of Howard Street, Howard Street would be closed to cross traffic at The Embarcadero. To expedite the flow of MUNI Metro vehicles, Harrison Street would also be closed to left turning traffic. As a result, northbound traffic along The Embarcadero would require two left turn lanes at Mission Street. Since the Embarcadero/Mission intersection is expected to be at capacity during peak periods by Year 2000, additional left turning vehicles could not be accommodated. The resulting queues and stop and go conditions would affect Mission Street circulation at Steuart, thus impeding MUNI use of the turnaround facility at Mission/Steuart.

Surface turnback operation would also produce queuing of traffic at Folsom aggravating the high level of localized CO emissions at this intersection and creating risk of MUNI related accidents. Metro operating reliability would be diminished and the effectiveness of the Advanced Train Control System would be reduced. These impacts cannot be mitigated.

S.3.3 UNDERGROUND ALTERNATIVE

Short Term. Cut and cover excavation would occur over a longer and wider area, presenting slightly greater risk for cracking of facades of adjacent buildings and affecting greater numbers of Embarcadero Freeway support piers. The cut and cover section could take approximately four months longer to complete than the Surface Alternative. One hundred forty-one Port parking places would be displaced for a maximum of 40 months. Because of the south of Howard portal location, a sewer line may need relocation and access across The Embarcadero at Howard Street would be temporarily disrupted.

Long Term. In addition to providing the requisite capacity gains in the Market Street subway, the Underground Alternative completely conceals turnback operation, thus eliminating visual and noise disturbances to adjacent land uses. Although a surface tail track crossing Folsom would be utilized for temporary storage of disabled trains, the frequency of train movements on the surface would be relatively insignificant compared with the Surface Alternative. Therefore, pedestrian access and traffic circulation would not be impeded. However, the portal location near a future Rincon Point park may intrude visually on the parkscape. Impacts, under this alternative, can be mitigated.

S.3.4 TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE

Short Term. None

Long Term. TSM improvements could increase the number of trains per hour in the Market Street subway, but could not provide sufficient capacity to meet projected demand, a primary goal of the City's Downtown Plan and Transit First policy. At best, with the installation of the Advanced Train Control System, MUNI could operate 25 trains per hour and maintain schedule reliability. This level of service is insufficient to meet projected demand which requires a minimum of 30 trains per hour. Because ridership growth could not be accommodated under this scenario, people would have to rely on autos and other forms of transportation to reach their destinations, further congesting downtown streets and contributing to air pollution. These project impacts are unmitigated.

S.3.5 NO-ACTION ALTERNATIVE

Short Term. None.

Long Term. The existing crossover and turnback facility at Embarcadero Station allows a maximum of 22 trains per peak hour to operate in the Market Street subway. This level of service would be the least successful of all alternatives in accommodating projected demand.

TABLE S.3. SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

LAND USE, PLANNING, PUBLIC POLICY	SOCIAL AND COMMUNITY CHARACTERISTICS	ECONOMIC AND FINANCIAL CHARACTERISTICS	TRAFFIC AND TRANSPORTATION	URBAN DESIGN	AIR QUALITY
SURFACE ALTERNATIVE					
Short term. None anticipated.	Short Term and Long Term. None identified.	Short Term. Potential loss of revenue from displaced Port of San Francisco parking. Potential loss of revenue for San Francisco Recreation and Parks Department from construction impacts on scheduled activities at Justin Herman Plaza. Total employment expected from constructing the Surface Alternative would be approximately 2,200 jobs, generating over $21 million in salaries, regionwide.	Short Term. Construction will impact the Embarcadero Roadway from Market to Howard and Steuart Street south of Howard. Access to the Agriculture Building and buildings along The Embarcadero between Mission and Howard will be impeded. Port of San Francisco will lose 121 parking spaces for 36 months. Use of MUNI bus turnaround at Steuart Street will be disrupted during construction.	Short Term. Unmitigated visual impacts from construction activities will affect The Embarcadero from Mission through Bryant.	Short Term. Construction related emissions will produce localized CO concentrations.
Long Term. Land use changes will occur in block south of Howard Street along The Embarcadero as a result of Embarcadero Roadway realignment. Increased capacity to accommodate peak hour downtown demand conforms with City of San Francisco Comprehensive Plan and Municipal Railway Short Range Transit Plan 1987-92.		Long Term. Capital costs for vehicles, facilities, TSM improvements, and miscellaneous costs at $71.8 million. Operating and maintenance costs at $1.32 million per year.	Long Term. Traffic delays will occur at Folsom/Embarcadero intersection because of surface train operation. Because the Howard/Embarcadero and Harrison/Embarcadero intersections would be closed to left turning traffic, Mission Street would need to absorb additional left turns, affecting peak period traffic movements (LOS F) and MUNI areas movements at Steuart and Mission. Surface turnback will affect pedestrian circulation across The Embarcadero, although all intersections along The Embarcadero currently available for pedestrian crossing will remain open for pedestrians under this alternative. Vehicle and pedestrian movements across Metro tracks would increase the risk of accidents involving Metro vehicles. Additionally, surface turnback operation would not be compatible with the new Automatic Train Control System. Beneficial impacts would occur from added transit capacity, fewer downtown auto trips.	Long Term. Adverse visual impact to East Street ROW buildings because of adjacent portal construction could occur. Adverse impact on physical access of pedestrians to the waterfront would result because of location of track and turnback operations in the median of The Embarcadero.	Long Term. Beneficial impact from increased use of MUNI Metro, reduced number of auto trips to downtown.

TABLE S.3. (CONTINUED). SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

LAND USE, PLANNING, PUBLIC POLICY	SOCIAL AND COMMUNITY CHARACTERISTICS	ECONOMIC AND FINANCIAL CHARACTERISTICS	TRAFFIC AND TRANSPORTATION	URBAN DESIGN	AIR QUALITY
UNDERGROUND ALTERNATIVE					
Short Term. Same as Surface Alternative.	Short Term and Long Term. None identified.	Short Term. Same as Surface Alternative. However, total construction-related employment would be approximately 3,000 jobs, generating over $29 million in salaries, regionwide.	Short Term. Same as Surface Alternative except that the number of displaced Port parking spaces would increase to 140 for a 40 month period. The Embarcadero will be affected by cut and cover construction a half block further south than in the Surface Alternative.	Short Term. Same as Surface Alternative.	Short Term. Same as Surface Alternative.
Long Term. Same as Surface Alternative.		Long Term. Capital costs for vehicles, facilities, TSM improvements, and miscellaneous costs at $91.8 million. Operating and maintenance costs at $.87 million per year.	Long Term. Beneficial impact from underground turnaround operations: surface automobile and pedestrian access will not be impacted by turnback operations; conversely, train operations will not be impacted by auto and pedestrian circulation. Beneficial impacts will result from downtown trips on transit rather than by automobile.	Long Term. Visual and physical access to/from the Waterfront will not be impacted by turnback operations. Street closures and left hand turn options will be enhanced over surface alternative. Careful design of portal structure could minimize potential barrier impact.	Long Term. Beneficial impacts are the same as those described in the Surface Alternative.

TABLE S.3 (CONTINUED). SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

NOISE	ENERGY	CONSTRUCTION METHODS	WATER RESOURCES	BIOLOGY	HAZARDOUS MATERIALS	HISTORICAL, ARCHAEOLOGICAL, CULTURAL IMPACTS	PARKLANDS
SURFACE ALTERNATIVE							
Short Term							
Noise impacts will occur as a result of construction at Justin Herman Plaza and Bayfront Promenade.	Additional fuel consumption for construction is insignificant.	Tunneling and cut and cover excavation will cause settling, vibration, possible cracking of pavement and building facades. Existing BART/MUNI tunnel and Embarcadero Freeway structures will require additional support. A section of the Embarcadero Roadway between Mission and Howard will be torn up. Underground utilities will need support or relocation. Major telecommunication vault at portal location will require costly relocation.	Dewatering may result in ground settlement in cut and cover construction zone.	Drilling and grouting in Justin Herman Plaza may affect grass and plants.	Presence of hazardous materials may exist at project site. Removal of hazardous materials may delay construction.	Tunneling and cut and cover excavation may uncover artifacts/cultural resources.	Construction activities will generate noise, vibration and dust at Justin Herman Plaza and Bayfront Promenade. Justin Herman Plaza will be adversely affected by grouting activities and possible subsidence. San Francisco Recreation and Parks Department may lose money if revenue producing events can not be scheduled during construction. MUNI construction will precede development of the proposed Rincon Point Park.
Long Term							
Noise from exhaust fan required for underground Metro operation will affect southern end of Justin Herman Plaza. Noise from passing trains will increase noise levels at Rincon Point and residential units at Hills Plaza by 3 dBA. This increase is within City Noise Ordinance limitations.	Additional electrical consumption for MUNI Metro turnback operation is insignificant.	Continued subsidence in construction area may occur.	None anticipated.	None anticipated.	None anticipated.	The Old Seawall and Belt Line Railway may be impacted.	Tunnel exhaust fan placed at southern end of Justin Herman Plaza will be equipped with attenuators to reduce the noise level to below San Francisco Master Plan standards.

TABLE S.3. (CONTINUED). SUMMARY OF SIGNIFICANT ENVIRONMENTAL EFFECTS

NOISE	ENERGY	CONSTRUCTION METHODS	WATER RESOURCES	BIOLOGY	HAZARDOUS MATERIALS	ARCHAEOLOGICAL, CULTURAL IMPACTS	PARKLANDS
UNDERGROUND ALTERNATIVE							
Short Term							
Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative although the major telecommunications vault at Howard Street will not be affected by this alternative. There may be slight additional risk to adjacent buildings and added expense for freeway structure stabilization along The Embarcadero between Mission and Howard because of the wider cut and cover excavation.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.
Long Term							
None anticipated since turnback operation is underground.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative.	Same as Surface Alternative. Except the Belt Line Railway would not be impacted.	Same as Surface Alternative.

S.4 FINANCIAL SUMMARY

S.4.1 CAPITAL COSTS

The Turnaround Project requires capital expenditure for fixed facilities and, in the case of the build alternatives, rolling stock. Transportation Systems Management (TSM) improvements need to be implemented as well to realize the full benefit of the build alternatives. The comparison of capital costs are as follows:

CAPITAL COST SUMMARY IN 1988 (MILLIONS OF DOLLARS)

	EIS ALTERNATIVES			
	#1 SURFACE	#2 UNDERGROUND	#3 TSM	#4 NO-BUILD
Fixed Facilities	60.793	83.262	-	-
Rolling Stock (Turnaround)	9.100	6.500	-	-
TSM	1.500	1.500	1.500	-
Miscellaneous Costs	.402	.621	-	-
TOTAL	71.795	91.883	1.500	0

S.4.2 OPERATION AND MAINTENANCE COSTS

The annual operation and maintenance costs for the Turnaround Project are estimated in 1988 dollars as follows:

Surface Alternative	$1.32 million
Underground Alternative	$ .87 million
TSM Alternative	-
No-Action Alternative	-

The figures include the annual operation and maintenance costs of the new turnback facilities and the additional LRVs required for the Turnaround Project. The difference between the two build alternatives reflects the added route length and operating time required for surface turnback operations and two additional LRVs required by Alternative 1. It does not include miscellaneous costs, such as potential insurance costs related to the surface turnback operations.

Over a 25 year period, the difference in the cumulative operating and maintenance costs for the two build alternatives increases to over $28 million. The annualized costs, whereby all initial capital costs are converted to annual costs and added to the O&M costs, favor the Surface Alternative; the Surface Alternative would be $8.62 million compared with $10.16 million for the Underground Alternative.

S.5 SELECTION OF THE LOCALLY PREFERRED ALTERNATIVE

S.5.1 SELECTION PROCESS

On October 25, 1988, the San Francisco Public Utilities Commission (PUC) approved Resolution #88-0374 that selected the Underground Alternative as the locally preferred alternative for the MUNI Metro Turnaround Project (see Appendix D). The PUC resolution culminated PUC/MUNI staff evaluation of the Draft EIS and public comments received through written submittal and oral presentation to the PUC at the public hearing on October 4, 1988. The written comments included a memorandum from the San Francisco Planning Commission stating that the Underground Alternative is consistent with the Master Plan and that the Surface Alternative is inconsistent with specific master plan objectives and implementing actions (see Appendix D).

The Draft EIS and public comments were reviewed by the PUC staff Capital Program Working Committee, which recommended the Underground Alternative to the Capital Program Management Committee, composed of PUC and MUNI managers. The managers unanimously endorsed the Underground Alternative at their October 13, 1988, meeting and forwarded their recommendation to the PUC along with supporting information and a summary of public comments.

S.5.2 EVALUATION CRITERIA

In making their selection of the locally preferred alternative, the Public Utilities Commission analyzed several factors to determine the advantages and disadvantages of each alternative. The factors were:

1. Meeting project objectives, particularly in accommodating 20 year ridership projections and in facilitating a southern extension of MUNI Metro to Mission Bay.

2. Capital and operating costs.

3. Capability to integrate with the proposed new Advanced Train Control System (ATCS).

4. Operational control of/potential delay factors to MUNI Metro system, including the opportunity to reduce coupling of trains at West Portal and Duboce Portal.

5. Conformity with City Master Plan, Port and Redevelopment Plans, and area Specific Plans.

6. Visual and noise impacts.

7. Associated traffic impacts.

8. Maintainability of capital improvements.

9. Public comments, community acceptability.

S.5.3 RATIONALE FOR CHOOSING THE UNDERGROUND ALTERNATIVE

In evaluating the four alternatives, the San Francisco Public Utilities Commission (PUC) found that the Underground Alternative, although requiring the greatest capital expenditure, was superior to the other alternatives in meeting project objectives and addressing issues reflected in the evaluation criteria. Specifically, the Underground Alternative would expedite turnback operation of MUNI Metro trains at the easterly end of the Market Street subway, would permit MUNI Metro to accommodate a 20 year ridership growth, and would facilitate construction of a southern extension of MUNI Metro to Mission Bay. Neither the No Project nor TSM alternatives could meet these project objectives and, therefore, were eliminated as viable options.

Although most project objectives could be accomplished under the Surface Alternative, this alternative would not respond to the evaluation criteria as well as the Underground Alternative. For example, both build alternatives are designed to accommodate projected peak period demand--30 trains an hour. However, because of the underground's exclusive right-of-way and anticipated use of advanced train control, capacity would be increased to 36 trains an hour, while the surface alternative is limited to 30 trains an hour. Therefore, the underground turnback allows for an incremental capacity increase of one-half as opposed to one-third with a surface treatment. That marginal difference would provide greater flexibility in train dispatching and thus improved reliability, schedule adherence, and reduced overcrowding.

Additionally, the Underground Alternative was found by the San Francisco Planning Commission to be in conformance with the City Master Plan. The Surface Alternative would be inconsistent with certain Master Plan objectives, particularly in terms of waterfront urban design, pedestrian access and additional traffic impacts resulting from surface turnback operation. The Planning Commission, as well as the Redevelopment Agency, the Port, and private developers, expressed concern that surface turnback operation of MUNI Metro along The Embarcadero between Howard and Bryant would affect access from their respective developments to the Bayfront Promenade, future Ricon Point park, and port activities at Pier 24-26. Additional noise and visual intrusion related to the portal location adjacent to the historic East Street Row buildings and to the surface turnback operation between Howard and Folsom were also cited as disadvantages of the Surface Alternative.

City agencies noted that traffic movements along the Embarcadero Roadway would be restricted under the Surface Alternative since the median of the Harrison and Howard Street intersections would be closed to left-turning vehicles, thereby funneling left turn movements from The Embarcadero onto Mission Street. The Mission/Embarcadero intersection is forecasted to be operating at Level of Service F during peak hours without the Turnaround by the year 2000 (see Table 4.4-1). The additional left turning traffic would aggravate the congested conditions in The Embarcadero/Mission area and, because of queueing vehicles and slow moving traffic, could be expected to affect movement of MUNI vehicles accessing the bus turnaround facility one block west at Steuart and Mission and the downstream transit operation of the Mission Street high occupancy vehicle lanes.

In addition to the possible delays to bus operation on Mission, MUNI Metro operation could also experience delays at Folsom Street under the Surface Alternative. The potential delays would result from left turning traffic and pedestrians crossing the tracks at Folsom/Embarcadero. Although signal preemption would favor MUNI Metro at this intersection, rush hour traffic could be expected to slow train movements, thereby increasing Metro running times and enhancing the risk of accidents involving MUNI vehicles (see Figure 4.4-3).

Additionally, under the Surface Alternative, control and management of Metro operations would be more limited than with the Underground Alternative since the new Advanced Train Control System could not be utilized for surface turnback operation. Because of manual surface turnback operation and cross traffic at Folsom Street, MUNI Metro would experience delays under the Surface Alternative, particularly at rush hour. The delays resulting from surface turnback operation could affect schedule reliability throughout the MUNI Metro system and preclude the possibility of reducing coupling of trains at West Portal and Duboce Portal.

Because the surface turnback operation would occur in two distinct zones along The Embarcadero, maintainability of the surface facilities would be more costly than a more compact underground turnback. Added costs would also be generated by the increased operating time associated with the surface turnback operation (estimated at $.44 million per year over the operating costs for the Underground Alternative) and by the requirement for two additional rail vehicles to service the Surface Alternative.

In support of the PUC selection of the Underground Alternative, public comments overwhelmingly favored the Underground Alternative over the Surface Alternative. Public comments can be found in Chapter 7.

CHAPTER 1

1. BACKGROUND PURPOSE AND NEED

1.1 BACKGROUND HISTORY OF MUNI METRO AND PROJECT ORIGIN

1.1.1 HISTORY OF MUNI

The San Francisco Municipal Railway (MUNI) was created in 1912 as the nation's first publicly owned transit system. MUNI's first line operated on Geary Street from Market, and was later augmented by other service to most parts of the City of San Francisco. Its largest competitor was the United Railroads Company (later the Market Street Railway Company). Streetcar service on Market Street was so intensive that four tracks were necessary to handle all the cars.

After the first World War, the transit industry came increasingly under public ownership, and the Market Street Railway was finally purchased by the City in September 1944. Many of the former private company's Market Street lines were converted to trolley coach operation. The cable car lines came to MUNI with the purchase of the Market Street Railway and the California Street Cable Railroad Company in 1952.

During the era when most cities did away with their electrically powered service, San Francisco's was retained and modernized. In recent years, MUNI has converted two diesel bus lines to trolley coach operation, and more electric service is planned. In 1980, the MUNI Metro system opened, putting the light rail services underground in the downtown area, and allowing higher speeds and shorter trips. During a 20 month period from 1982 to 1984, all three cable car lines were completely refurbished at a cost of nearly $60 million, and are now ready to offer both residents and visitors another century of service.

Today, MUNI offers the nation's most varied and comprehensive transit network. In the fiscal year 1986-87, MUNI's operating budget was $226.3 million. The system employs over 3,700 staff, full time and part time. The MUNI fleet now totals over 1,000. Light rail vehicles (LRVs), trolley coaches, cable cars, and motor coaches cover nearly 80 routes, and provide service to all parts of the City. Over 95 percent of the City's addresses are within two blocks of a MUNI stop, and the 850,000 weekday passenger boardings make MUNI America's most heavily used transit system on a per capita basis.

1.1.2 DEVELOPMENT AND IMPROVEMENT OF MUNI METRO

During the 1970s, MUNI's capital improvement efforts centered on the construction and start-up of the MUNI Metro subway/surface light rail system. BART used approximately $140 million of its construction bond proceeds to construct the tunnel and subway stations. MUNI expended an additional $150 million to provide station furnishings, the track, train control and power distribution systems and to procure the basic fleet of 100 Boeing light rail vehicles. Soon after Metro operation began in 1980, ridership on the system exceeded even the most optimistic projections made during the planning and construction phases. Subsequent MUNI capital projects provided the facilities and rolling stock improvements necessary for a 30 percent increase in Metro peak period capacity, e.g., the acquisition of 30 additional LRVs in 1983, the replacement of the Geneva streetcar barn with a modern rail service and shop facility and the construction of Metro Center Annex which houses MUNI's expanded electronics repair and LRV maintenance functions.

Two other significant Metro improvements were begun in the early 1980s in order to enhance the safety and efficiency of the operation: trainlining and Forest Hill Station rehabilitation. Both projects were included in the original plans for Metro operation but had been deferred due to funding and environmental constraints. Trainlining modifications to the Boeing LRVs now allow one operator in a lead car to control the doors, steps, and intercom of a multi-car train. In 1985, MUNI completed a $6 million renovation to Forest Hill Station to provide improved ventilation, handicapped access, and station amenities. The renovation provides the Forest Hill Station with safety and convenience comparable to the other Metro stations while preserving the original architectural integrity of the station built in 1918.

To address problems of vehicle and service reliability in the Metro system, MUNI has made a series of modifications to components of the Boeing LRV fleet, such as couplers and air compressors, that have been prone to in-service failures or require excessive on-going maintenance.

1.1.3 PLANS AND ACTIONS WHICH IDENTIFIED THE PROPOSED PROJECT

Plans for an improved turnback facility immediately east of the Embarcadero Station have been discussed by the San Francisco Municipal Railway and Public Utilities Commission for over a decade. In September 1978, a Draft Environmental Impact Statement, Market Street Subway-MUNI Track Extension, prepared for the U.S. Department of Transportation examined eight alternatives to construct a track extension and turnaround facility for the soon to be operational MUNI Market Street subway. It was known at that time that the track arrangement immediately west of the Embarcadero Station might not be adequate to reverse train direction and maintain sufficient peak hour headways commensurate with projected demand. The study was never finalized because the project was incorporated into the I-280 Transfer Concept Program in 1978.

A design report for a Track Extension and Turnaround (Sverdrup/Foster, 1978), was simultaneously released with the aforementioned Draft EIS. The design report investigated alternatives to provide an efficient turnaround and greater operational flexibility at the downtown terminus of the MUNI Market Street subway. Two general concepts were examined, a crossover easterly of Embarcadero Station and various loops easterly of the station.

Of the alternative designs, Loop Alternative No. 5, which generally encircled the southern portion of Justin Herman Plaza in the right-of-way of Market, Spear, Mission, and The Embarcadero, was chosen by MUNI as the basis for final design.

The initial San Francisco Municipal Railway Short Range Transit Plan 1979-84 (1979) extracted information from the aforementioned reports and set a high priority for capital grant funding to construct a turnaround facility. Additionally, a comprehensive examination of transportation/circulation improvements along the Waterfront south of Market Street, entitled I-280 Transfer Concept Program Environmental Impact Report (San Francisco, 1984), was published by the City of San Francisco and the California Department of Transportation. It included the MUNI Metro Turnaround facility, based on the recommendation of the 1978 Sverdrup/Foster report, and southern extension to China Basin as elements of six alternatives examined.

In September 1984, the San Francisco Public Utilities Commission released a Request for Proposals (RFP), Design of San Francisco Municipal Railway MUNI Metro Turnaround Facilities Easterly of Embarcadero Station. The RFP stated:

> "It is proposed to extend the tracks east of the station in order to provide a more efficient arrangement which will:
>
> - accommodate the more frequent and reliable turnaround of the MUNI Metro trains;
> - provide supplementary tracks for storage space for additional cars to meet peak demands;
> - store disabled cars without interfering with subway operations; and
> - facilitate a future service extension to the south."

1.1.4 CURRENT MUNI METRO OPERATIONS

SCHEDULED OPERATIONS

The current MUNI schedule calls for the following surface headways, time between trains, and train consists during the two hour P.M. peak from 4 P.M. to 6 P.M.:

LINE	HEADWAY	TRAIN CONSIST
J-Church	6 minutes	1 car
K-Ingleside	12 minutes	2 cars
L-Taraval	6 minutes	2 cars
M-Ocean View	12 minutes	2 cars
N-Judah	6 minutes	2 cars

The surface lines converge into the subway at an average headway, time between trains, of 180 seconds, which yields 20 trains per hour. The K, L, and M cars couple into four car trains and the J and N cars couple into three car trains. The scheduled peak operation requires 101 cars in service of the 130 car fleet.

ACTUAL OPERATION

Actual coupling strategy varies from that described above. Wide variances in inbound arrival times at the portals tends to decrease the amount of coupling (particularly at Duboce) and increase the number of trains. If none of the J and N cars are coupled, then the average headway in the subway would decrease to 144 seconds, yielding 25 trains per hour. Actual current operation appears to be between 20 and 22 trains per hour.

PASSENGERS CARRIED

Annual single trips on MUNI Metro has been about 39,000,000 passengers for the past two years (San Francisco Municipal Railway Short Range Transit Plan 1987-92, 1987). Weekday boardings average 140,000. Approximately 11,800 passengers pass the maximum load point at Van Ness Station during the P.M. peak period from 4 P.M. to 6 P.M. (DKS Associates, 1987).

1.1.5 TERMINAL OPERATION

The present track layout is a two track stub with a crossover located immediately west of the station to reverse direction of the trains. The crossover is signalled for 27 mph, although eastbound trains must immediately slow to 10 mph to enter the station. Space is provided on the easterly end of each main track to store three vehicles.

Eastbound trains are automatically routed to the next available track by the signal system. Westbound trains are dispatched manually from a local control console. Trains are held a minimal time for schedule. The supervisor can assume local control at any time to reroute trains or remove a disabled car.

The current time to reverse a train is about 90 seconds and is primarily due to the time required for the operator in each vehicle to separately change ends and restart the train before the train can depart.

Current schedules during peak hours require the operation of 20 trains per hour per direction at this terminal. This may increase to 22 trains per hour depending on variations in the amount of coupling at Duboce Portal. Approximately 25 trains per hour per direction can be operated if there are no malfunctions of vehicles or control; this represents the maximum capacity of the current layout, equipment, and operating methods.

1.1.6 TERMINAL CAPACITY

The capacity of the current MUNI Metro system is a function of the train control system, the operating methods and practices, operating reliability, and the terminal track layout at Embarcadero Station as discussed in following subsections. Currently, 20 trains per hour offers 18,600 places of seats and standing room available in westbound (outbound) direction during the afternoon peak (4 to 6 P.M.) based on a load factor of 2.0 (Wong, San Francisco Municipal Railway Service Planning Department, 1986).

1.1.6.1 TERMINAL CAPACITY DUE TO TRAIN CONTROL

Studies by George Beetle Company (Train Operations Simulation Assessments, George Beetle Co., 1987) have determined that the existing train control system (with nominal Transportation Systems Management improvements) will support a minimum design headway, time between trains, of 90 seconds with uniform 20 second station dwells, time stopped in station, or 100 seconds with actual current average dwells which range from 14 to 42 seconds. From this information, the following capacity comparison can be made:

BASIS	STATION DWELL (IN SECONDS)	MEAN HEADWAY (IN SECONDS)	THROUGHPUT TRAINS/ HOUR
1987 Schedule	14-42	180	20
Improved Schedule J&N Not Coupled	14-42	144	25
Practical Design	14-42	100	36
Theoretical Design	20	90	40

It appears that significant improvement of current capacity, even beyond the projected 20 year growth, would be possible with the existing train control system if other system constraints, listed below, did not exist.

1.1.6.2 TERMINAL CAPACITY DUE TO OPERATING METHODS AND PRACTICES

The George Beetle Company studies found that wide variances in operating methods and practices have a significant impact on capacity. The following factors were identified:

a. Variances in the surface train schedules are due to street traffic.

b. Train handling variances reflect the different practices used by MUNI train operators.

c. Station dwell variances reflect variable passenger volumes and train operator practics.

d. Train turning variances reflect the time for the operator to key, walk to other end of LRV, check and prepare the LRV to start; but exclude passenger boarding time.

e. LRV coupling and uncoupling variances reflect the time to assemble and break down four car trains at the two portals.

The adverse effect of these variances has been reduced by the efforts of MUNI management and staff to develop and implement various operating and scheduling strategies since revenue service began in 1980 (San Francisco Municipal Railway, 1987). This is an evolving process, and further improvements are expected. However, significant further reduction of these variances will only be achieved with the introduction of a form of Advanced Train Control System (ATCS). The Conversion to ATCS is discussed in An Evaluation of SELTRAC Automatic Train Control System (Bechtel, 1987-J), and is a long term goal of MUNI, being pursued as a capital improvement separate from the Turnaround Project.

1.1.6.3 TERMINAL CAPACITY DUE TO OPERATING RELIABILITY

The operating reliability of the LRVs has improved since 1980 due to the preventative maintenance program and design modification program implemented by the MUNI Equipment Maintenance Division. In addition, the reliability of the Duboce Junction turnouts and the Embarcadero crossover has been improved by the replacement of moveable-point frogs with flange bearing frogs. Operating reliability does not limit the current capacity of the proposed operation to handle the 20 year growth.

1.1.6.4 TERMINAL CAPACITY DUE TO TRACK LAYOUT

Improvements to the above factors since 1980 allow the current Embarcadero terminal layout to function efficiently for a throughput of 20 to 22 trains per hour. However, the two track layout to turn all trains does limit terminal capacity to approximately 25 trains per hour per direction under current operating methods and practices.

1.1.7 PROJECT GOALS AND OBJECTIVES

The goal of the MUNI Metro Turnaround Project is to improve the operating efficiency and capacity of the Metro. The objectives are to:

- Provide additional capacity (30 trains per hour) to accommodate the growth in ridership on the existing Metro system as forecast by the City for the year 2007.

- Provide the opportunity to reduce coupling of trains at West Portal and Duboce Portal, thus reducing passenger delays and operating expenses.

- Improve operating reliability by nominal cost changes to the vehicles and signal system, as described in the Transportation Systems Management (TSM) alternative.

- Provide side tracks to turnback a significant portion of the trains off the mainline tracks, thus providing an opportunity for a direct connection to a future Metro extension to the south.

- Provide operating improvements with minimum impacts to the surrounding land uses; conform with City policy and Waterfront plans.

1.2 PURPOSE AND NEED FOR THE TURNAROUND FACILITIES

1.2.1 PURPOSE OF THE TURNAROUND FACILITY

The purpose of the project is to provide a more efficient turnback track configuration that would handle the 20 year growth in traffic and would provide the opportunity for future direct rail connection of a southern extension of MUNI Metro to Mission Bay.

1.2.2 NEED FOR SERVICE IMPROVEMENT OF THE MUNI METRO SYSTEM

The MUNI Metro System must be capable of carrying the expected growth in patronage over the next 20 years, in accordance with an efficient operating plan which does not degrade the passenger's ability to find a place on a train. This ability is defined by the peak two hour average volume/capacity ratio in all the operations studies referred to in this document. Capacity of the MUNI light rail vehicle (LRV) is defined as 140 places (68 seated plus 72 standing) at the industry standard of 4 standees per square meter.

PATRONAGE PROJECTIONS

The ridership projections were prepared by DKS Associates based on Recht Hausrath & Associates data and are contained in Reference No. 8. In accordance with directions from the City, these projections are based on employment and housing estimates prepared for the Department of City Planning. Reference No. 8 also contains ridership projections based on regional ABAG estimates of employment and housing. The latter projections were prepared to meet UMTA requirements and to determine the significance of the difference between the two projections. The results of this work are summarized in Table 1.2-1.

FUTURE OPERATING PLAN FOR THE SURFACE AND UNDERGROUND ALTERNATIVES

A schedule to handle the above patronage projections was prepared based on increasing capacity by reducing headways and increasing efficiency by eliminating coupling of the J and N lines at Duboce Portal. This schedule is based on the following two hour P.M. headways and train consists:

		HEADWAYS (MINUTES)		
LINE	SURFACE CONSIST	STREET OPERATIONS	MARKET STREET SUBWAY	SOUTHERN EXTENSION
J	2	10	10	-
K	2	10		-
L	2	4/6	5	-
M	2	10		-
N	2	4/6	4/6	4/6

The J and N two car trains would operate uncoupled through the subway; the J would turnback at the Turnaround and the N trains would continue on the Extension. K, L, and M two car trains would couple at West Portal and operate through the subway, then turnback at the Turnaround. An average of 30 trains per hour direction would operate in the subway during the two hour P.M. peak. The average headway would be two minutes.

TABLE 1.2-1. MUNI METRO PATRONAGE PROJECTIONS, TWO HOUR P.M. PEAK PERIOD

FORECAST SCENARIO	MARKET STREET SUBWAY OUTBOUND AT VAN NESS	PERCENT INCREASE FROM EXISTING
Existing (1986)	11,800	-
Short Range (City 1995) Without Extension	13,140	12.9
Twenty Year (City 2007) Without Extension	13,400	13.6
Twenty Year (ABAG 2005) With Extension	12,240 (a)	3.7

Sources: DKS Associates, July 23, 1987.
DKS Associates, December 19, 1986.

(a) ABAG projections, which assume less downtown San Francisco employment growth than forecasts prepared for the City by Recht Hausrath, include the Southern Extension to Mission Bay; however, this has a minor influence at the Van Ness Station.

The excess capacity of the Underground Alternative was tested and reported in the Summary Operations Report (page 46 of Reference Document #1). Current schedule operation is 20 trains per hour. Patronage projections will require 30 trains per hour per direction, while the existing signal system limits theoretical capacity to 40 trains per hour.

Operations simulations confirm the ability of the Turnaround alternatives to handle 30 trains per hour (a 50 percent increase in number of trains). In addition, simulations indicate that, with the Underground Alternative and ATO system, 36 trains per hour can be handled without significant increase in delay (an 80 percent increase in number of trains).

The passenger's ability to find a place was tested by calculating the V/C ratio as defined above. The reduced ratio shown in Table 1.2-2 indicates that the proposed operating plan is acceptable.

Other operating plans were tested as described in Reference No. 8. The plan to hold the current headways is very attractive since no additional vehicles are required due to the projected 20 year growth; however, the average V/C ratio was degraded to 0.62.

TABLE 1.2-2. VOLUME TO CAPACITY RATIO SUMMARY (4-6 P.M. PEAK)

ROUTES	EXISTING OPERATION	PROPOSED FUTURE PLAN
J	0.48	0.45
K	0.68	0.64
L	0.62	0.59
M	0.69	0.65
N	0.56	0.53
Average	0.60	0.57

TABLE 1.2-3. SURFACE ALTERNATIVE DELAY COMPARISONS WITH 2006 SCHEDULE

	EXISTING (1) TERMINAL
EASTBOUND DIRECTION	
Trains Operated	63
Trains Delayed	55 (87% delayed)
Average Delay Per Train Delayed (Sec)	268.7
Standard Deviation	191.0
Total Train Delay for Period (Min:Sec)	246:21
WESTBOUND DIRECTION	EXISTING (1) TERMINAL
Trains Operated	54
Trains Delayed	21 (39% delayed)
Average Delay Per Train Delayed (Sec)	38.6
Standard Deviation	37.5
Total Train Delay for Period (Min:Sec)	16:39
TOTAL EAST + WEST DELAY	263:00 (2)

NOTES

(1) Simulation Request #11, Reference #5

(2) Delay calculation is for the P.M. peak period from 3:50 to 6:00.

EMBARCADERO TERMINAL CAPACITY

The ability of the existing Embarcadero Terminal and current Metro operating practices to handle the projected growth of patronage in accordance with the proposed operating plan was tested by operations simulation methods by the George Beetle Company. The results are presented in Reference No. 8 and are summarized in Table 1.2-3.

The most significant delay occurs to eastbound (inbound) trains approaching the Embarcadero Station to be reversed on one of the two existing turning tracks. During the peak period these trains are delayed an average of 269 seconds and stack up from the Embarcadero Crossover out to Van Ness Station. Given the current operating practices, the increased number of trains cannot be reversed efficiently on the existing two tracks. A new turnaround facility is required to provide at least three turning tracks.

TRANSPORTATION SYSTEMS MANAGEMENT

The Transportation Systems Management (TSM) improvements described in Alternative No. 3 need to be implemented as part of Alternatives 1 and 2 in order to realize the full benefits of a new turnback facility. However, they are not sufficient in themselves to allow the existing Embarcadero Station terminal to handle the future operating plan without similar delay.

1.3 PLANNING CONTEXT

1.3.1 THE ENVIRONMENTAL PLANNING AND PROJECT APPROVAL PROCESS

Since the City of San Francisco is requesting Federal funding to design and build a turnaround facility, the City must follow guidelines established under the National Environmental Protection Act (NEPA) of 1969 and by Urban Mass Transportation Administration (UMTA), the Federal granting agency. The Federal guidelines are found in 49 CFR Part 622, Environmental Impact and Related Procedures, as well as in the UMTA Draft Procedures and Technical Methods for Transit Project Planning, 1986. These procedures are utilized to examine and evaluate a range of alternatives, including a "no-action" alternative, that can help the City of San Francisco meet its transportation goals. The San Francisco Public Utilities Commission acts as the cooperating agency for the Turnaround Project, and, under UMTA guidelines, produces the requisite documentation and public review process to evaluate and choose a preferred alternative. In order to choose a preferred alternative, several steps are followed according to NEPA regulations. They include:

1. The alternatives must be presented for public comment at a scoping session. The initial scoping meeting was held on March 5, 1986. A task force of City and Consultant Staff identified and evaluated a wide range of alternative track layouts based on preliminary City requirements for an underground facility to turn back the trains plus additional facilities to store ready and disabled trains, to bypass trains, to perform minor repairs to the vehicles, and to store maintenance of fixed facilities vehicles and equipment. Four underground alternatives were considered as part of the scoping process on March 5, 1986.

   Subsequent to the March 5, 1986, scoping meeting, studies were conducted to determine the economic justification for the preliminary City requirements and to determine the operating feasibility of various track layouts and reported in Reference Document No. 1.

   These studies concluded that:

   1. Additional underground facilities for storage and maintenance cannot be economically justified when compared with moving the vehicles to the Green Light Rail Center.

   2. It is feasible to locate a stub turnaround operation on the surface in the median of the proposed realigned Embarcadero Parkway.

   As a result of these findings, the previous four underground alternatives were set aside, and a new set of simplified alternatives were investigated to meet the City's objectives.

   Because new alternatives were developed, a subsequent scoping meeting was held on September 22, 1987. As a result of the above studies, completely new and simplified alternatives were developed. Of these, two "build" alternatives were selected for this scoping process. They represent a range in environmental impacts, operating expenses, and capital costs. The Surface Alternative consists of a tunnel section to minimize the construction impacts on the streets and plaza above and BART tunnels below, a cut and cover construction section to bring the main tracks to the surface as quickly as possible to minimize capital costs, and a two track stub turnback on the surface in The Embarcadero median. This is the minimum capital cost alternative that meets all of the City's operation requirements.

A second "build" alternative, the Underground Alternative, was developed to locate the turnback operation underground and to bring the mainline tracks to the surface in the median of The Embarcadero. This alternative requires additional capital cost to construct an underground facility for turnback operation.

The MUNI Metro Turnaround Project EIS Scoping Report (January, 1988) Reference No. 4 was prepared to summarize the commentary received either at the scoping session or by letter and to respond to the concerns expressed.

As stated previously, the EIS examines these concerns as part of the overall process to evaluate and select the preferred alternative.

2. The alternatives and related comments received at the scoping session are examined for adverse and beneficial impacts. A Draft Environmental Impact Statement was prepared to identify the various impacts and possible mitigation measures associated with each of the alternatives studied.

3. The Draft EIS is published and reviewed by the public and local agencies. The Draft EIS was submitted for public review on August 26, 1988, beginning a 45 day comment period. A public hearing was conducted by the San Francisco Public Utilities Commission on October 4, 1988, to receive comments on the Draft EIS.

4. The City adopts a preferred alternative and prepares a Final EIS jointly with UMTA. The San Francisco Public Utilities Commission approved the Underground Alternative as the locally preferred alternative on October 25, 1988. All comments received on the Draft EIS including public hearing testimony have been responded to and incorporated into the Final EIS.

5. The City submits a request to UMTA for funding final design and construction. The City submitted a grant application to UMTA for funding final design in December, 1988; the Final EIS will be submitted to UMTA in August, 1989. A Memorandum of Agreement regarding procedures for the preservation of historic and cultural resources in the Project Area signed by UMTA and SHPO and concurred in by the San Francisco Public Utilities Commission is incorporated into the Final EIS.

1.3.2 THE EMBARCADERO PARKWAY PROJECT

The Turnaround Project will be constructed simultaneously with the plan to transform The Embarcadero between North Point and King Street into a four lane, treelined parkway. The redesigned roadway will provide a median for the portal and surface track of the Turnaround Project and a possible extension of MUNI Metro to Mission Bay. The Parkway and Turnaround Projects' design and construction schedule are interlinked since MUNI Metro is planning to follow the roadway realignment south from Howard Street. Additionally, the width and final design of the roadway south of Howard Street is in the same right-of-way as the Turnaround Project. Because of the interrelationship between these two projects, the Embarcadero Parkway is described in greater detail in Section 3.4.4 and the cumulative impact of planned transportation/circulation projects along the Central Waterfront is summarized in Section 4.16. A separate Federal environmental document will be published for the Parkway Project in November, 1989.

1.3.3 MUNI METRO EXTENSION TO MISSION BAY

Although the Turnaround Project includes only the rail facilities related to the more efficient turnback operations at the end of the Market Street subway, for the project facilitates the construction of other rail projects, particularly the extension of MUNI Metro to Mission Bay. The MUNI Metro Extension would continue the Metro rail line in the median of the Embarcadero Parkway south and west to the vicinity of Sixth and King. Because the extension does not require Federal funding, will be implemented at a later date, and is a separate and distinct project, which has independent utility, the project is considered within the scope of this EIS as a secondary impact of the Turnaround Project. Community interest and participation in the planning of the Mission Bay project, including planning of transit connections that link the Mission Bay area with downtown, require that the MUNI Metro Extension be described and previously identified potential impacts summarized. To this end, Sections 3.4.4 and 4.15 summarize the Extension project and identify its potential significant construction and long term impacts, respectively. The detailed impacts of the extension project will be considered in a separate future environmental document.

CHAPTER 2

2. DESCRIPTION OF THE PROPOSED PROJECT ALTERNATIVES

2.1 PROJECT LOCATION

Figure 2.1-1 and Figure 2.1-2 show the project location in San Francisco and the study area for the MUNI Metro Turnaround Project respectively. Of the four project alternatives described below, two provide new turnback facilities along or under the Embarcadero Roadway. A subway would be constructed connecting the existing MUNI Metro Embarcadero Station with the proposed turnback facilities. Two other alternatives require no modification to the existing turnback at Embarcadero Station.

2.2 ALTERNATIVES SELECTION AND SCREENING PROCESS

2.2.1 ALTERNATIVES CONSIDERED

The MUNI Metro Turnaround Project EIS examines four alternatives. They are:

1. Embarcadero Surface Alternative.

2. Embarcadero Underground Alternative.

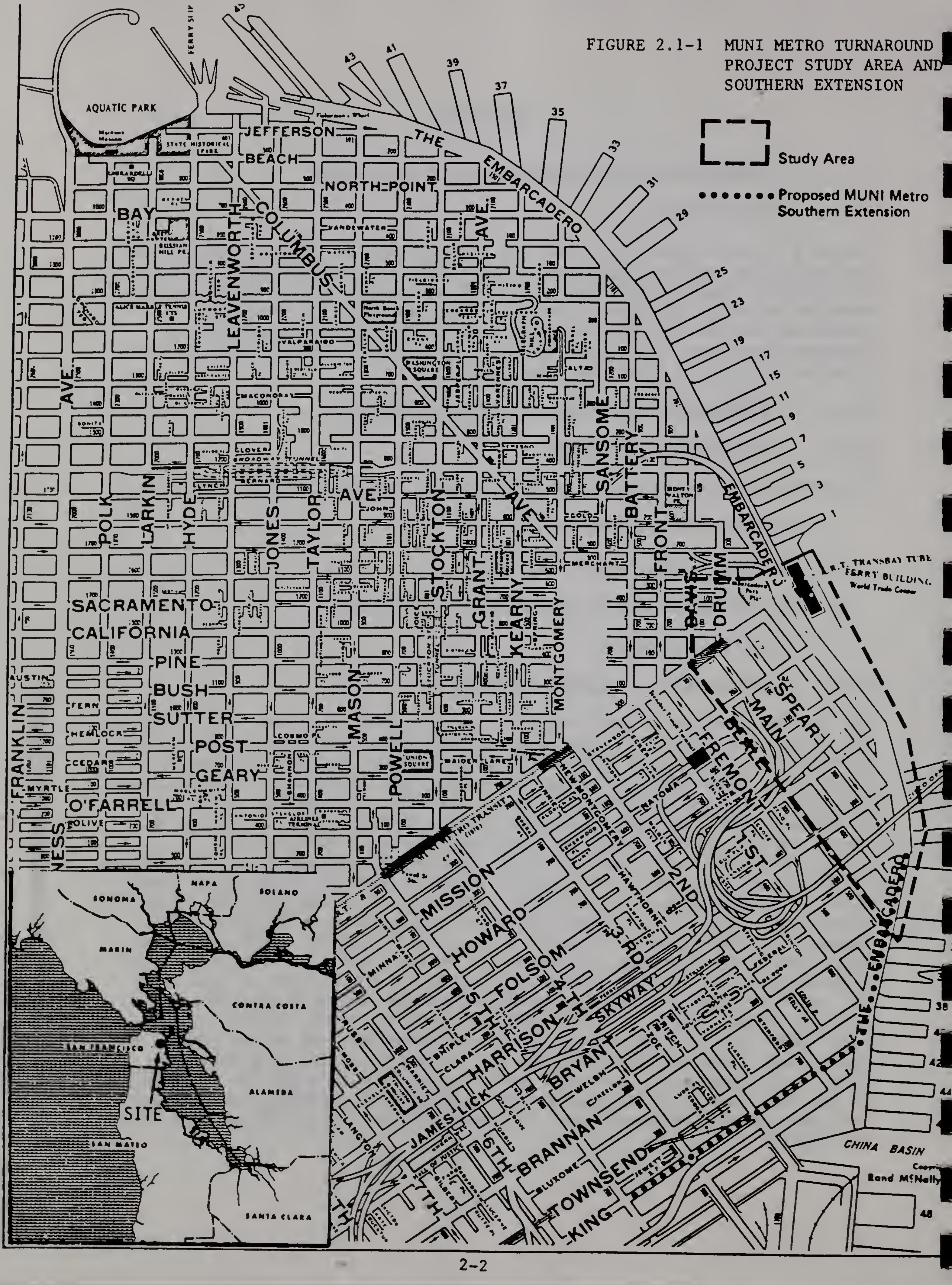
3. Transportation Systems Management Alternative.

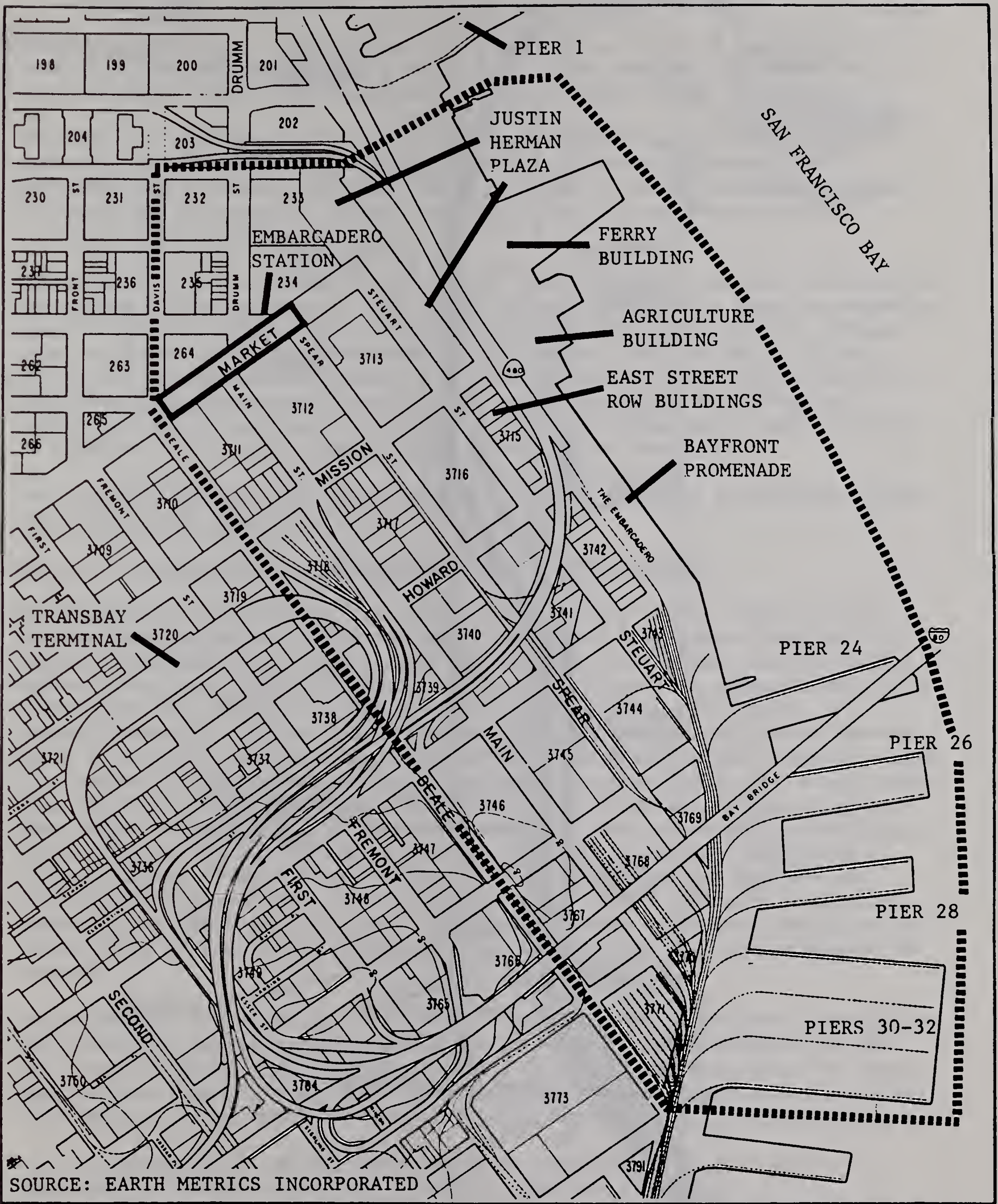
4. No-action Alternative.

2.2.2 ALTERNATIVE 1 - SURFACE ALTERNATIVE

The Surface Alternative would begin at the east end of the Embarcadero Station and proceed northeast in a twin tunnel subway beneath Market Street, generally over the BART tunnels, to Steuart Street (see Figure 2.2-1). The tunnels would curve to the south under Justin Herman Plaza to a proposed ventilation structure under the Embarcadero Roadway and clear of the Plaza. This is an underground structure with an exposed grating for the intake or exhaust of air. The same structure will be constructed for both Alternative 1 and 2. From this point the route would continue southeasterly in subway open cut structure, then curve to the right under the elevated Embarcadero Freeway near the Mission Street intersection. Between Mission and Howard Streets, the route would ascend to a surface alignment in the median of The Embarcadero Parkway at Howard Street. The surface route would continue southeast in The Embarcadero median through reverse curves to the north line of Folsom Street. A center track for turning a four-car train would be provided in this block. The route would continue in The Embarcadero median across Folsom Street, Harrison Street, and to the north side of realigned Bryant Street. In the last block the main tracks would spread to accommodate two center tracks, one for turning a four car train and one for temporary holding of a disabled train. The disabled train would remain on the holding track for the duration of the rush hour to allow other trains to operate on schedule. Following the rush hour period, MUNI would move the disabled train to the maintenance shop for repair.

FIGURE 2.1-1 MUNI METRO TURNAROUND PROJECT STUDY AREA AND SOUTHERN EXTENSION


Study Area
Proposed MUNI Metro Southern Extension
AQUATIC PARK
JEFFERSON
BEACH
NORTH POINT
BAY
COLUMBUS
LEAVENWORTH
THE EMBARCADERO
VAN NESS AVE
POLK
LARKIN
HYDE
JONES
TAYLOR
STOCKTON
GRANT AVE
KEARNY
MONTGOMERY
SANSOME
BATTERY
FRONT
DAVIS
DRUMM
BROADWAY TUNNEL
PACIFIC AVE
SACRAMENTO
CALIFORNIA
PINE
BUSH
SUTTER
POST
GEARY
O'FARRELL
FRANKLIN
MASON
POWELL
UNION SQUARE
WASHINGTON SQUARE
B.A.R.T. TRANSBAY TUBE
FERRY BUILDING
World Trade Center
MISSION
HOWARD
FOLSOM
HARRISON
BRYANT
BRANNAN
TOWNSEND
KING
JAMES LICK SKYWAY
BEALE
FREMONT
MAIN
SPEAR
NEW MONTGOMERY
HAWTHORNE
NATOMA
1ST
2ND
3RD
4TH
5TH
6TH
7TH
8TH
CHINA BASIN
Rand McNally
SONOMA
NAPA
SOLANO
MARIN
CONTRA COSTA
SAN FRANCISCO
ALAMEDA
SITE
SAN MATEO
SANTA CLARA


PIER 1
JUSTIN HERMAN PLAZA
EMBARCADERO STATION
FERRY BUILDING
AGRICULTURE BUILDING
EAST STREET ROW BUILDINGS
BAYFRONT PROMENADE
SAN FRANCISCO BAY
TRANSBAY TERMINAL
PIER 24
PIER 26
PIER 28
PIERS 30-32
DRUMM
DAVIS ST
FRONT
MARKET
MAIN
SPEAR
STEUART
MISSION ST
HOWARD
BEALE
FREMONT
FIRST
SECOND
THE EMBARCADERO
BAY BRIDGE
480
80
198
199
200
201
202
203
204
230
231
232
233
234
235
236
237
262
263
264
265
266
3709
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3791

SOURCE: EARTH METRICS INCORPORATED

N

SCALE
NO SCALE

FIGURE 2.1-2 ENLARGEMENT OF MUNI METRO TURNAROUND PROJECT STUDY AREA

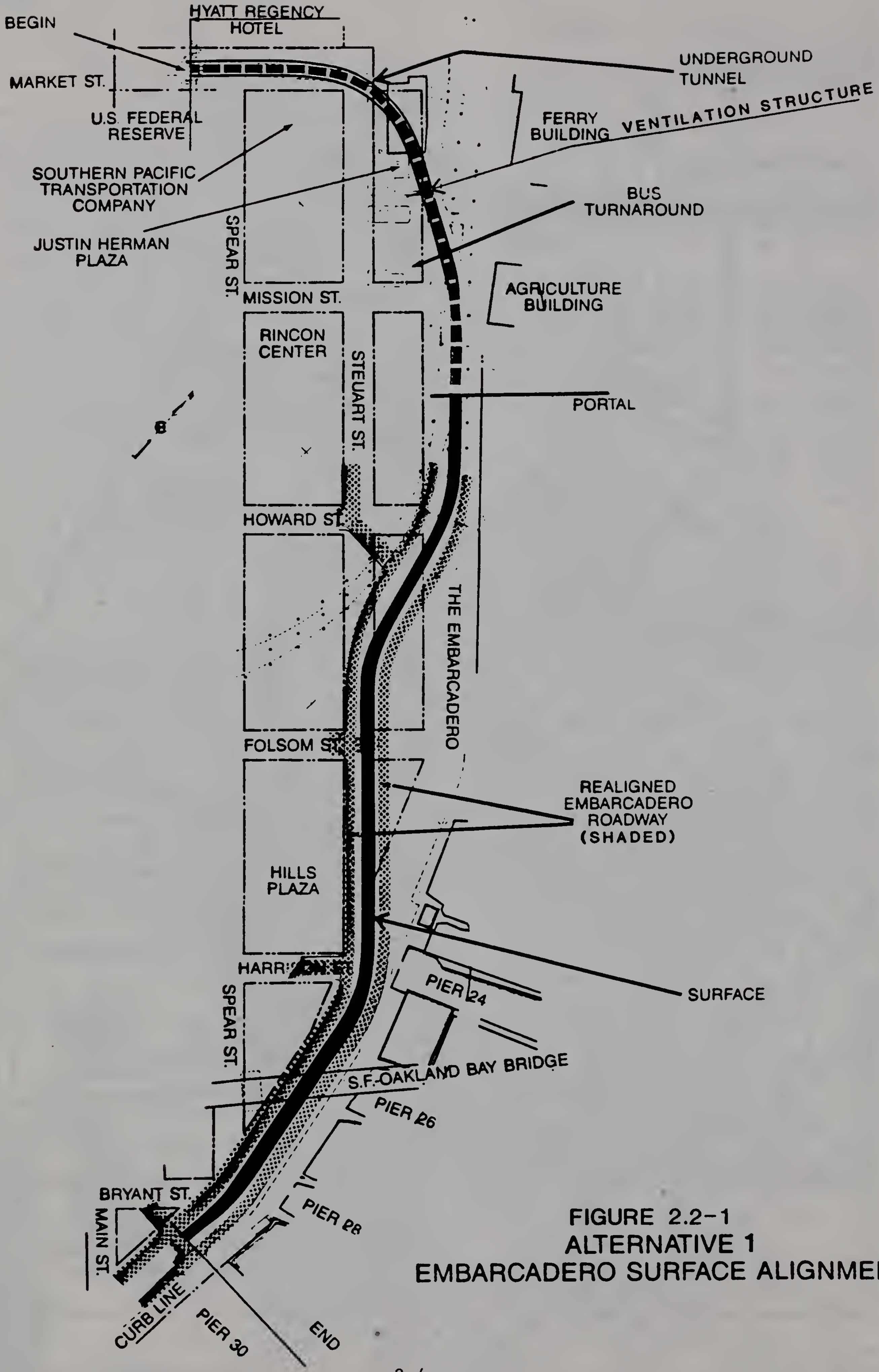

BEGIN
HYATT REGENCY HOTEL
MARKET ST.
UNDERGROUND TUNNEL
U.S. FEDERAL RESERVE
FERRY BUILDING
VENTILATION STRUCTURE
SOUTHERN PACIFIC TRANSPORTATION COMPANY
JUSTIN HERMAN PLAZA
BUS TURNAROUND
SPEAR ST.
MISSION ST.
AGRICULTURE BUILDING
RINCON CENTER
STEUART ST.
PORTAL
HOWARD ST.
THE EMBARCADERO
FOLSOM ST.
REALIGNED EMBARCADERO ROADWAY (SHADED)
HILLS PLAZA
HARRISON ST.
PIER 24
SURFACE
SPEAR ST.
S.F.-OAKLAND BAY BRIDGE
PIER 26
BRYANT ST.
MAIN ST.
PIER 28
CURB LINE
PIER 30
END

FIGURE 2.2-1
ALTERNATIVE 1
EMBARCADERO SURFACE ALIGNMENT

In this alternative, the Embarcadero Parkway median would be closed to cross traffic at Howard and Harrison streets. At Folsom Street, eastbound traffic would be able to turn left onto the northbound lanes of The Embarcadero.

The mainline tracks would be spaced to accommodate a future center platform station between Folsom and Harrison streets. A future Metro southern extension would connect with the turnback tracks at the north side of realigned Bryant Street. Neither the future station nor extension are included in this project.

Operationally, the existing train control system would be extended through the new subway to the new portal near Howard Street. All trains would be manually operated on the surface with train separation controlled by wayside signals. Track switches would be power operated and remotely controlled by a local supervisor and/or central control. The center track near Folsom Street and the two middle tracks near Bryant Street would be signalled to turn back trains in regular service. The existing layout at Embarcadero Station would be signalled to turnback trains under non-scheduled conditions.

The proposed year 2007 operating plan for this alternative is described under Future Operating Plan in Section 1.2.2.

2.2.3 ALTERNATIVE 2 - EMBARCADERO UNDERGROUND ALIGNMENT

The Embarcadero Underground Alternative would have a subway tunnel section similar to Alternative 1, from the east end of the Embarcadero Station to a proposed ventilation structure under the Embarcadero Roadway clear of Justin Herman Plaza (see Figure 2.2-2). The route would continue southeasterly in a subway open cut structure under the Embarcadero Freeway adjacent to the westerly property line of The Embarcadero between Mission and Howard Streets. South of Howard, the tracks would spread to accomodate a center turnback track with access from both ends followed by a second center track with access only from the north. The route would then ascend to the median of the realigned Embarcadero Parkway south of Howard Street. One main track would continue on the surface across Folsom Street for 330 feet, for temporary holding of a disabled train. Figure 2.2-3 compares the alignments of the Surface and Underground Alternatives. This alignment would retain left turn vehicular movements at Howard and Harrison. The holding track would be transferred to a center track in the median between Harrison and Bryant when the extension is complete.

Operationally, the existing train control system would be extended through the new subway to the new portal near Folsom Street. Surface operation on the tail track would be under manual control. All track switches would be power operated and remotely controlled by a local supervisor and/or central control. Both center pockets would be signalled to turnback trains in regular service.

As in Alternative 1, the existing layout at Embarcadero Station would be signalled to turnback under non-scheduled conditions.

The proposed year 2007 operating plan would be the same as Alternative 1.

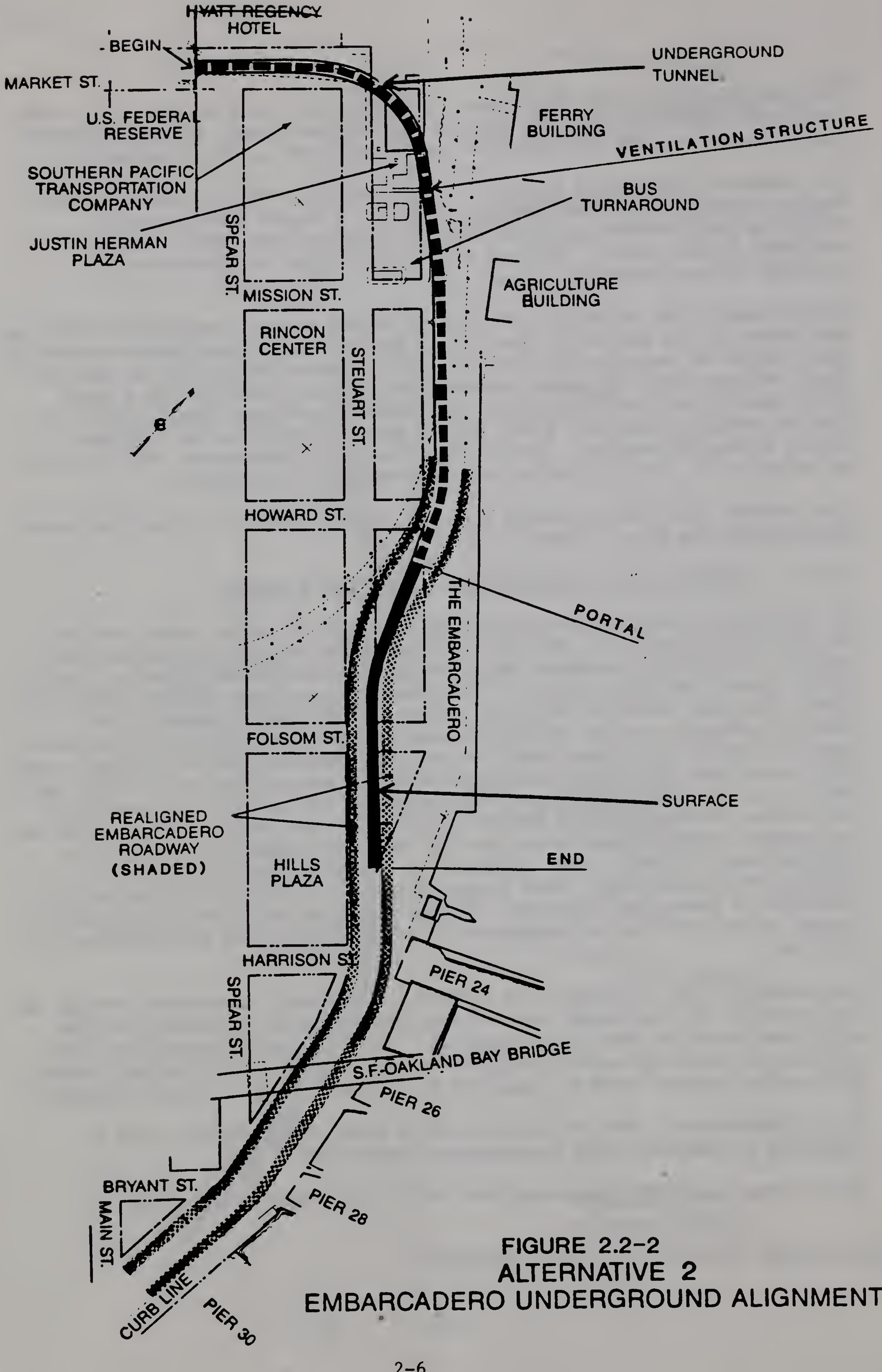
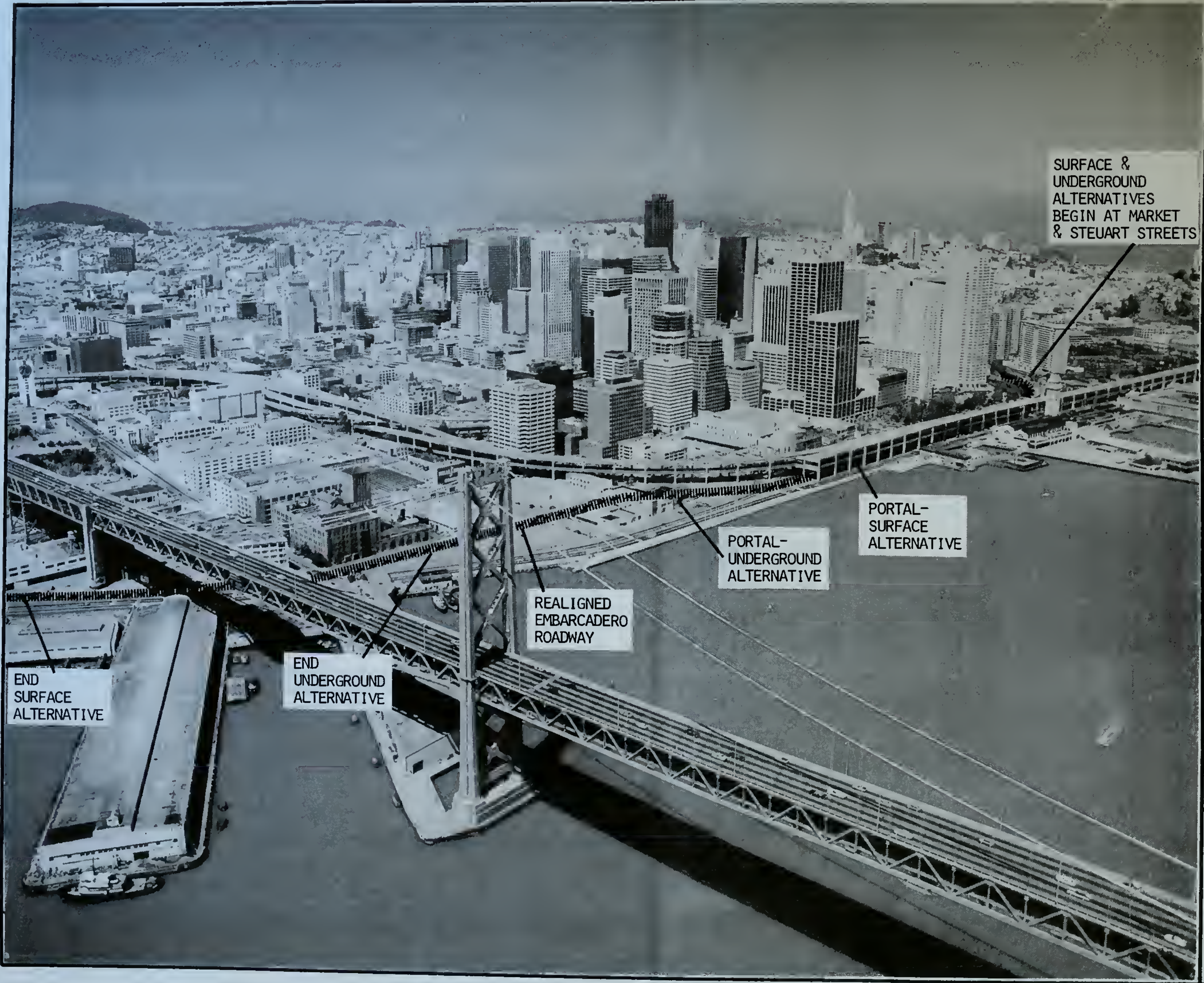

~~HYATT REGENCY~~
HOTEL
BEGIN
MARKET ST.
U.S. FEDERAL
RESERVE
SOUTHERN PACIFIC
TRANSPORTATION
COMPANY
JUSTIN HERMAN
PLAZA
UNDERGROUND
TUNNEL
FERRY
BUILDING
VENTILATION STRUCTURE
BUS
TURNAROUND
SPEAR ST.
MISSION ST.
AGRICULTURE
BUILDING
RINCON
CENTER
STEUART ST.
HOWARD ST.
THE EMBARCADERO
PORTAL
FOLSOM ST.
SURFACE
REALIGNED
EMBARCADERO
ROADWAY
(SHADED)
HILLS
PLAZA
END
HARRISON ST.
PIER 24
SPEAR ST.
S.F.-OAKLAND BAY BRIDGE
PIER 26
BRYANT ST.
MAIN ST.
PIER 28
CURB LINE
PIER 30

FIGURE 2.2-2
ALTERNATIVE 2
EMBARCADERO UNDERGROUND ALIGNMENT


SURFACE & UNDERGROUND ALTERNATIVES BEGIN AT MARKET & STEUART STREETS
PORTAL-SURFACE ALTERNATIVE
PORTAL-UNDERGROUND ALTERNATIVE
REALIGNED EMBARCADERO ROADWAY
END UNDERGROUND ALTERNATIVE
END SURFACE ALTERNATIVE

PHOTOGRAPHY: Neil Sutherland
Julian Essam

San Francisco From The Air
Text by: Bill Harris
Crescent Books, New York, 1986

FIGURE 2.2-3
AERIAL VIEW OF PROPOSED SURFACE AND UNDERGROUND ALTERNATIVES

2.2.4 ALTERNATIVE 3 - TRANSPORTATION SYSTEMS MANAGEMENT

The Transportation Systems Management (TSM) Alternative would provide a low cost approach to addressing MUNI Metro transportation problems. It also provides a baseline against which all of the major investment alternatives are measured. The TSM Alternative represents the best that can be done for mobility with the existing infrastructure, that is, without construction of a new transit guideway. Generally, the TSM Alternative emphasizes upgrades in transit service through operational and small physical improvements.

The TSM alternative would include the following modifications to the existing train control system and to the light rail vehicles (LRV) to increase speed and reliability, and to reduce the time to reverse the trains:

1. Vehicle Brake Modification. The existing LRV brake system does not adequately compensate for the effects of profile grade or slope of the track. If adequate braking is not provided, the emergency brakes are applied automatically to bring the train to a full stop. This system provides for safe operation of the train; however, it encourages the drivers to operate at less than the indicated safe speed to avoid the automatic application of emergency brakes. Three alternative modifications to the brake system are proposed in Reference No. 7 which would ensure proper brake application or profile grades, thus increasing Metro capacity.

2. Train-line the Reversing Functions. The existing light rail vehicles (LRV) must be individually reversed by the driver who removes his key from one end, walks to the other end, and inserts his key. Each LRV in a train of up to four LRVs must be reversed in this manner. The improvement proposed would allow the entire train to be reversed by the removal and insertion of keys at the end cabs of the train. This would be accomplished by installing new control circuits through the couplers between LRVs.

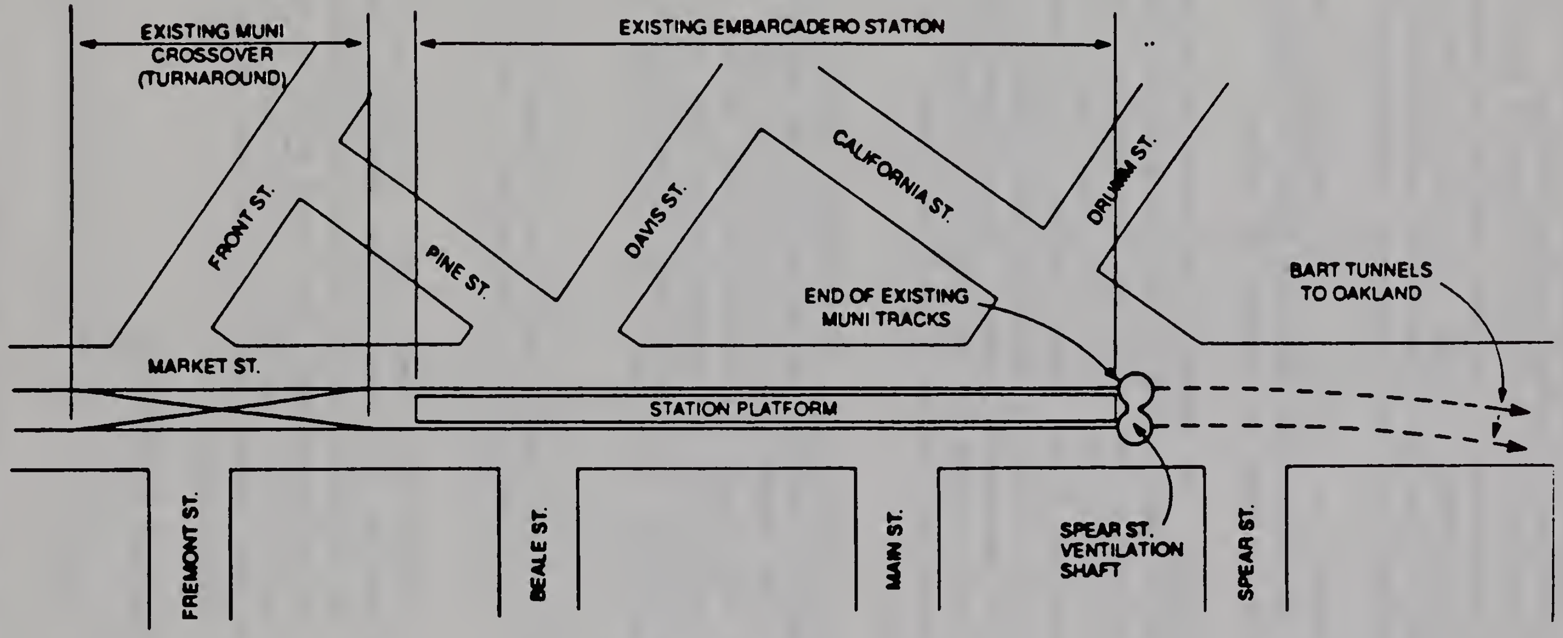
3. Wayside Signal Changes. Train speeds would be increased by minor wiring modifications at 23 locations in the subway as defined in Reference No. 7.

4. Additional Speed Code. Three safe speed codes (10, 27, and 50 mph) are presently transmitted through the track to the vehicles. The code received is displayed in the cab, and the driver may operate up to the indicated limit. If the driver exceeds the limit plus two mph, the emergency brakes are automatically applied. The proposed change would increase the number of speed codes from three to four, thus allowing a higher average speed between stations.

2.2.5 ALTERNATIVE 4 - NO-ACTION ALTERNATIVE

The No-action Alternative is based on no new MUNI facilities nor changes to Metro operation.

As shown in Figure 2.2-4, the existing MUNI Metro Market Street subway line ends at the east end of the Embarcadero Station. BART, which is located below the MUNI level, continues easterly under the Bay to Oakland and other East Bay cities.


EXISTING MUNI CROSSOVER (TURNAROUND)
EXISTING EMBARCADERO STATION
FRONT ST.
PINE ST.
DAVIS ST.
CALIFORNIA ST.
DRUMM ST.
END OF EXISTING MUNI TRACKS
BART TUNNELS TO OAKLAND
MARKET ST.
STATION PLATFORM
FREMONT ST.
BEALE ST.
MAIN ST.
SPEAR ST. VENTILATION SHAFT
SPEAR ST.

SOURCE: BECHTEL NATIONAL, INC.

SCALE
NO SCALE

FIGURE 2.2-4 ALTERNATIVE 3 AND 4 TRANSPORTATION SYSTEMS MANAGEMENT AND NO ACTION

The current operation of 20 to 22 trains per hour through Embarcadero Station and the ultimate capacity of approximately 25 trains per hour is discussed in Section 1.1.4.

The inability of the existing facility to handle the proposed operating plan of 30 trains per hour is discussed in Section 1.2.2.

2.3 CAPITAL COST ESTIMATES

2.3.1 GENERAL

Capital Cost Estimates based on conceptual designs were prepared for the purpose of comparing the alternatives defined in this document. These costs, based on prices from Second Quarter 1988, are summarized in Table 2.3-1.

TABLE 2.3-1. CAPITAL COST SUMMARY IN 1988 (MILLIONS OF DOLLARS)

	EIS ALTERNATIVES			
	#1 SURFACE	#2 UNDERGROUND	#3 TSM	#4 NO-BUILD
Fixed Facilities	60.793	83.262	-	-
Rolling Stock (Turnaround)	9.100	6.500	-	-
TSM (a)	1.500	1.500	1.500	-
Miscellaneous Costs	0.402	0.621	-	-
TOTAL	71.795	91.883	1.500	0

(a) TSM improvements need to be implemented as part of Alternatives 1 and 2 in order to realize full operational benefits of the new turnback facility.

2.3.2 FIXED FACILITIES

The major types of construction for the Build Alternatives are summarized as follows:

CONSTRUCTION	ROUTE FEET ALTERNATIVE NO. 1 SURFACE	ROUTE FEET ALTERNATIVE NO. 2 UNDERGROUND
Subway - Twin Tunnel	840	840
Subway - Open Cut	543	1,058
U-Wall	382	386
Surface	2,236	526
TOTAL	4,001	2,810

Capital cost estimates for the Surface and Underground Alternatives are based on the conceptual design defined in the Final Engineering Report (Reference Document No. 2). The basis of the estimate, and the estimate summary sheets, are contained in the Conceptual Cost Estimate (Reference Document No. 6). A summary of the current costs for these two alternatives is contained in Table 2.3-2.

2.3.3 ROLLING STOCK

Capital Cost Quantities and Estimates for additional light rail vehicles (LRVs) are taken from the Operations Summary Report (Reference Document No. 1). A summary of these costs is shown in Table 2.3-3.

2.3.4 BUDGET ESTIMATE

Fixed facilities budget estimates for the Surface and Underground Alternatives were prepared based on current project costs plus escalation in accordance with an assumed construction schedule as follows:

	SCHEDULE Begin	SCHEDULE End
Phase I - Preliminary Design and EIS	September 1985	September 1989
Phase II - Final Design	October 1989*	December 1990
Phase III - Construction	January 1991	December 1993

An average escalation of 7.2 percent per year was assumed for the calculation, based on the 1977 to 1987 average of the Engineering News Record Construction Cost Index. Cash flow plans are included in Reference Document No. 6.

Budget estimates are shown in Table 2.3-4.

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* Budget estimates are based on a June 1989 start date; minor budget revisions may be required since Final Design cannot proceed until the Federal environmental process is complete.

TABLE 2.3-2. FIXED FACILITY COST ESTIMATE SUMMARY FOR SURFACE AND UNDERGROUND ALTERNATIVES (a)

	SECOND QUARTER 1988 ($ MILLIONS)	
ITEM	ALTERNATIVE NO. 1 SURFACE	ALTERNATIVE NO. 2 UNDERGROUND
Tunnel	19.585	19.585
Cut and Cover	12.812	26.475
Freeway Underpinning	2.788	6.405
Systemwide:		
- Track	2.065	1.732
- Mechanical	0.637	0.758
- Electrical	5.716	4.848
Special Services	0.450	0.550
TOTAL CONSTRUCTION	44.053	60.335
Design and Construction Management (15%)	6.608	9.050
Subtotal	50.661	69.385
Contingency (20%)	10.132	13.887
PROJECT TOTAL	60.793 (6.140) (b)	83.262 (8.409)

(a) Major exclusions from the Cost Estimate Summary are:

- Handling and disposal of toxic materials
- All new Embarcadero Parkway work including preparation of MUNI track subgrade, storm drain system, landscaping, traffic signals, lighting and utility work.
- Private property acquisition (to be acquired by Parkway Project).
- All costs to remove, relocate, or reconstruct the San Francisco Belt Railroad.
- Project insurance coverage of all parties.
- Special environmental costs such as the excavation of historic artifacts.
- All costs incurred by the City and other agencies including POSF, BART, California PUC, UMTA, and MTC.
- Final Engineering and related PUC administrative costs.
- All costs for a future Metro southern extension and passenger station at Folsom Street.
- Financing and interest during construction.

(b) Costs in ( ) are annualized costs over the 50 year service life based on a 0.101 factor from UMTA draft "Procedures and Technical Methods for Transit Project Planning" dated September 1986.

TABLE 2.3-3. ROLLING STOCK COST ESTIMATE SUMMARY FOR SURFACE AND UNDERGROUND ALTERNATIVES

	ALTERNATIVE NO. 1 SURFACE		ALTERNATIVE NO. 2 UNDERGROUND	
REQUIREMENT	LRVs	$MILLIONS	LRVs	$MILLIONS
Turnaround	7	$9.100 (1.00)	5	$6.500 (0.72)
20 Year Growth	19	24.700 (2.72)	19	24.700 (2.72)
TOTAL	26	33.800 (3.72)	24	31.200 (3.43)

NOTES:

(a) The Fleet/Peak vehicle ratio is 120 percent based on current MUNI spare ratio.

(b) Unit price of LRVs is $1.3 million based on San Francisco Municipal Railway Capital Improvement Program, 1986-1991, p. 74.

(c) Costs in ( ) are annualized costs over the 25 year service life based on a 0.110 factor from UMTA draft "Procedures and Technical Methods for Transit Project Planning" dated September 1986.

TABLE 2.3-4. FIXED FACILITY BUDGET ESTIMATE FOR SURFACE AND UNDERGROUND ALTERNATIVES (MILLIONS OF DOLLARS)

ITEM	ALTERNATIVE NO. 1 SURFACE	ALTERNATIVE NO. 2 UNDERGROUND
Project Total (1988)	$60.793	$83.262
Escalation to 1993	20.898	28.856
Budget Total	81.691	112.118

2.3.5 TSM COST ESTIMATE

Additional Operations Studies - Task No. 10, Train Control and Vehicle Improvements (Reference Document No. 7) identifies and discusses a set of Transportation Systtem Management (TSM) improvements which are included in Alternative No. 3 in this document.

The Components and Cost Estimate for the TSM Alternative are summarized in Table 2.3-5.

The total cost of the TSM improvements including contingency would be $1.5 million (1988 dollars). The annualized cost over a 25 year service life would be $0.16 million based on a 0.110 factor from UMTA draft "Procedures and Technical Methods for Transit Project Planning," dated September, 1986.

2.3.6 MISCELLANEOUS CAPITAL COSTS

The City will incur other costs during the implementation of this project which must be considered in the EIS process. Some of these costs can be quantified, but others can only be identified as potential costs to be quantified during final design or even construction.

QUANTIFIED MISCELLANEOUS COSTS

1. Costs to reroute MUNI trolley bus lines to compensate for the loss of a portion of the existing turnaround at Steuart and Mission Streets. MUNI estimates this cost at $250,000.

2. Loss of parking revenue for the Port of San Francisco during the construction period. The cost of $152,000 for the Surface Alternative and $371,300 for the Underground Alternative is developed and discussed in paragraph 4.3.2.1.

TABLE 2.3-5. TSM SUMMARY - ALTERNATIVE NO. 3

IMPROVEMENT	COST
1. Modify the service brake rate circuit to compensate for profile grades.	$ 260,000
2. Train-line the reversing function for all cars in a train set to speed up turnaround time.	$ 500,000
3. Revise the speed profiles to increase speed at 23 locations.	$ 23,000
4. Add one new speed code to increase overall speed.	$ 280,000
5. Contingency	$ 437,000
TOTAL	$1,500,000

POTENTIAL MISCELLANEOUS COSTS (CURRENTLY NOT QUANTIFIED)

1. Costs to meet the requirements of CCSF Ordinance No. 443-86, "Analyzing Soil for Hazardous Waste."
2. Costs associated with the excavation of historic artifacts found during the tunneling and open cut construction operations.
3. Additional BART costs to maintain service during the MUNI tunneling operation above the existing BART tunnels.
4. Additional cost due to construction conflicts between this project and other City projects such as the Embarcadero Parkway, MUNI Metro Extension, and MUNI F-line Extension.

2.4 OPERATIONS AND MAINTENANCE EXPENSE

2.4.1 GENERAL

Annual additional operating and maintenance (O&M) expenses were calculated based on the operating statistics calculated in Operating Plan A in Reference Document No. 1, and the variable cost rates for fiscal year 1986/1987 shown in MUNI's Standard Services Costing Worksheets for fiscal year 1986/1987 dated August 21, 1986. These additional expenses include only the costs associated with the owning, operating, and maintaining a vehicle; and the portion of the maintenance of the fixed facility that is a function of vehicle miles. It does not include the fixed expenses that are independent of the number of and operation of vehicles.

Annual additional O&M expenses were calculated for the projected 20 year growth of the existing MUNI Metro system and for the Turnaround Project alternatives, for the purpose of comparing the financial impact of these alternatives.

These expenses are presented in Table 2.4-1.

TABLE 2.4-1. ANNUAL ADDITIONAL OPERATIONS AND MAINTENANCE EXPENSES, 1987 (MILLIONS OF DOLLARS)

	EIS ALTERNATIVES			
	#1 SURFACE	#2 UNDERGROUND	#3 TSM	#4 NO-BUILD
20 Year Growth	2.348	2.348	2.348	2.348
Turnaround	1.320	0.873	-	-
TOTAL	3.668	3.221	2.348	2.348

2.4.2 UNDEFINED OPERATING EXPENSES

The Surface Alternative may incur additional operating expenses due to the greater risk of MUNI Metro delays, traffic and pedestrian accidents, and vandalism, all associated with surface Metro operations.

CHAPTER 3

3. DESCRIPTION OF THE AFFECTED ENVIRONMENT

The affected environment related to the MUNI Metro Turnaround Project is described herein. Although most of the following sections describe the existing setting for the area within the boundary, occasional reference to the blocks immediately adjacent to the project boundary and to particular transportation plans related to the Turnaround Project, but extending outside the project boundary, are cited.

3.1 LAND USE PLANNING AND PUBLIC POLICY

3.1.1 INTRODUCTION

This chapter discusses land use, planning and applicable public policies pertaining to the proposed project and the study area. This discussion is presented in two sections. Existing land uses, current planning and development trends are discussed in the first section. This is followed by a dicussion of applicable Federal, State and local plans and policies of public agencies and private companies which have regulations, jurisdictions, guidelines or plans related to the study area and the proposed project. References to the study area generally represent the larger area of secondary analysis related to the proposed project. Since land use issues for projects such as the MUNI Metro Turnaround are generally in close proximity to the facility, a smaller project area is identified within the larger study area (see Figure 3.1-1). Land use issues within the project area are generally discussed and later (Chapter 4) examined in somewhat more detail than the larger study area.

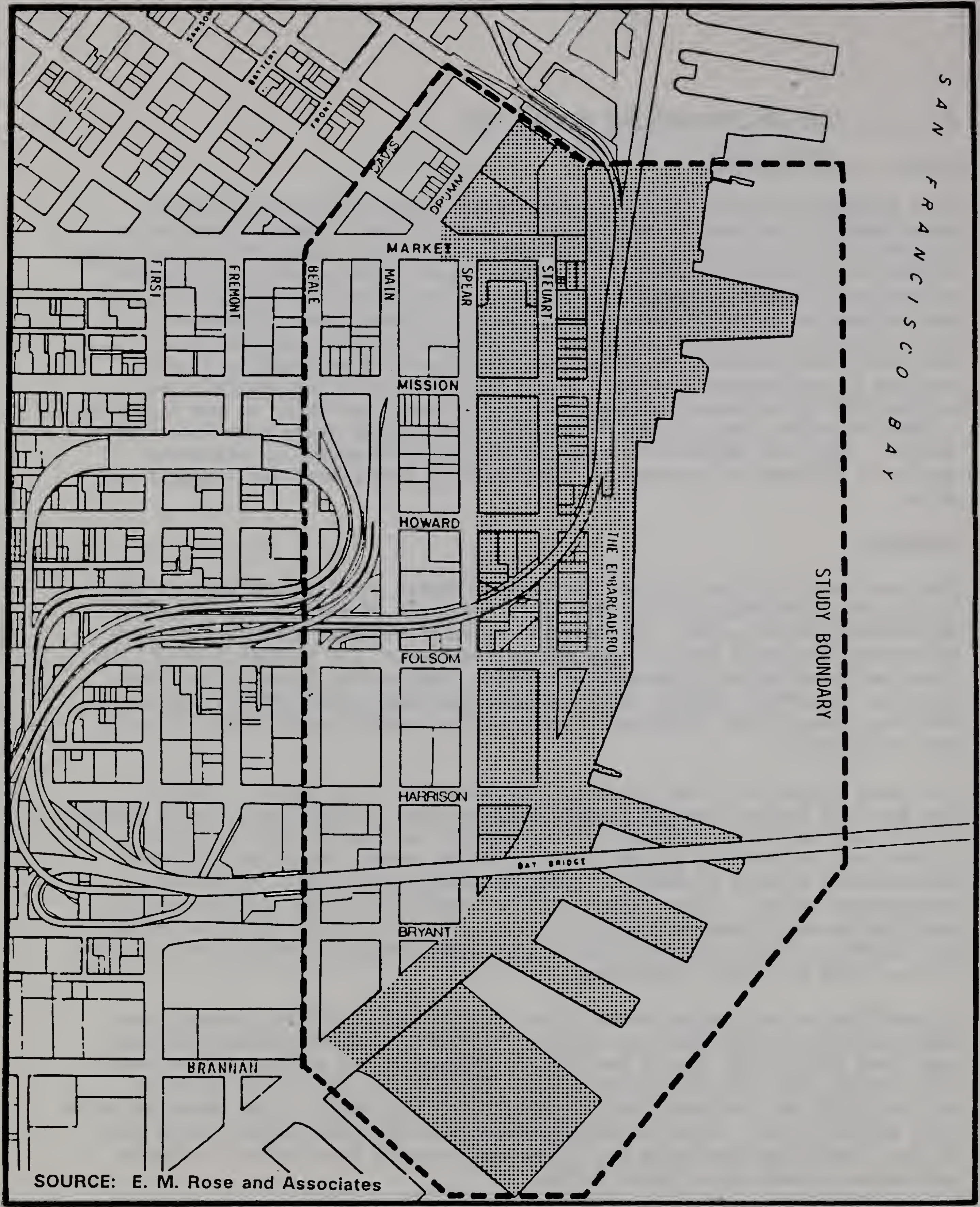
OVERVIEW

The land use study area for the Turnaround Project extends from Clay on the north, Davis and Beale on the west to the terminus of Beale at the Brannan-Embarcadero intersection. The eastern (bayside) boundary extends from Clay to Brannan and Beale and includes all of the Port of San Francisco facilities from the Ferry Building through Pier 30-32. The project boundary includes portions of several defined subareas including Embarcadero Center, the Ferry Building Area, Rincon Point-South Beach redevelopment area, Rincon Hill and pier facilities.

Land uses within the study boundary are discussed in two areas. They are the North of Market area and South of Market area. Market Street is an identifiable subarea boundary because the density of development north of Market is distinctive from the general South of Market area. The South of Market area obtains a sense of cohesion from the geographical limits and current development trends. Most of the land uses within the study are are located south of Market Street (see Figure 3.1-2). Therefore, for clarity of discussion purposes, Justin Herman Plaza and the Ferry Building complex are included in the South of Market discussion.

In addition to the Justin Herman Plaza and the Ferry Building complex, the South of Market study area encompasses 21 blocks, the Embarcadero Promenade and Piers 22-1/2, 24, 26, 28 and 30-32. Zoning in this portion of the study area ranges from industrial districts at the southern end in the vicinity of Pier 30-32 to the commercial districts in the vicinity of the Ferry Building (see Figure 3.1-3). South of Market height and bulk requirements range from 40 feet (40-X) for the Piers 26, 28 and 30-32 to 400 feet (400-S) at Beale and Market Streets (see Figure 3.1-4).

The North of Market study area includes five city blocks. Most of the project area north of Market Street is zoned for commercial uses (see Figure 3.1-3). Height and bulk designations range from 84 feet (84-X and 84-J) at and near the Ferry Building to 400 feet (400-S) in the intensively-developed blocks at Davis and Market Streets (see Figure 3.1-4).


SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
HOWARD
FOLSOM
HARRISON
BRYANT
BRANNAN
BAY BRIDGE
THE EMBARCADERO
STUDY BOUNDARY
SAN FRANCISCO BAY

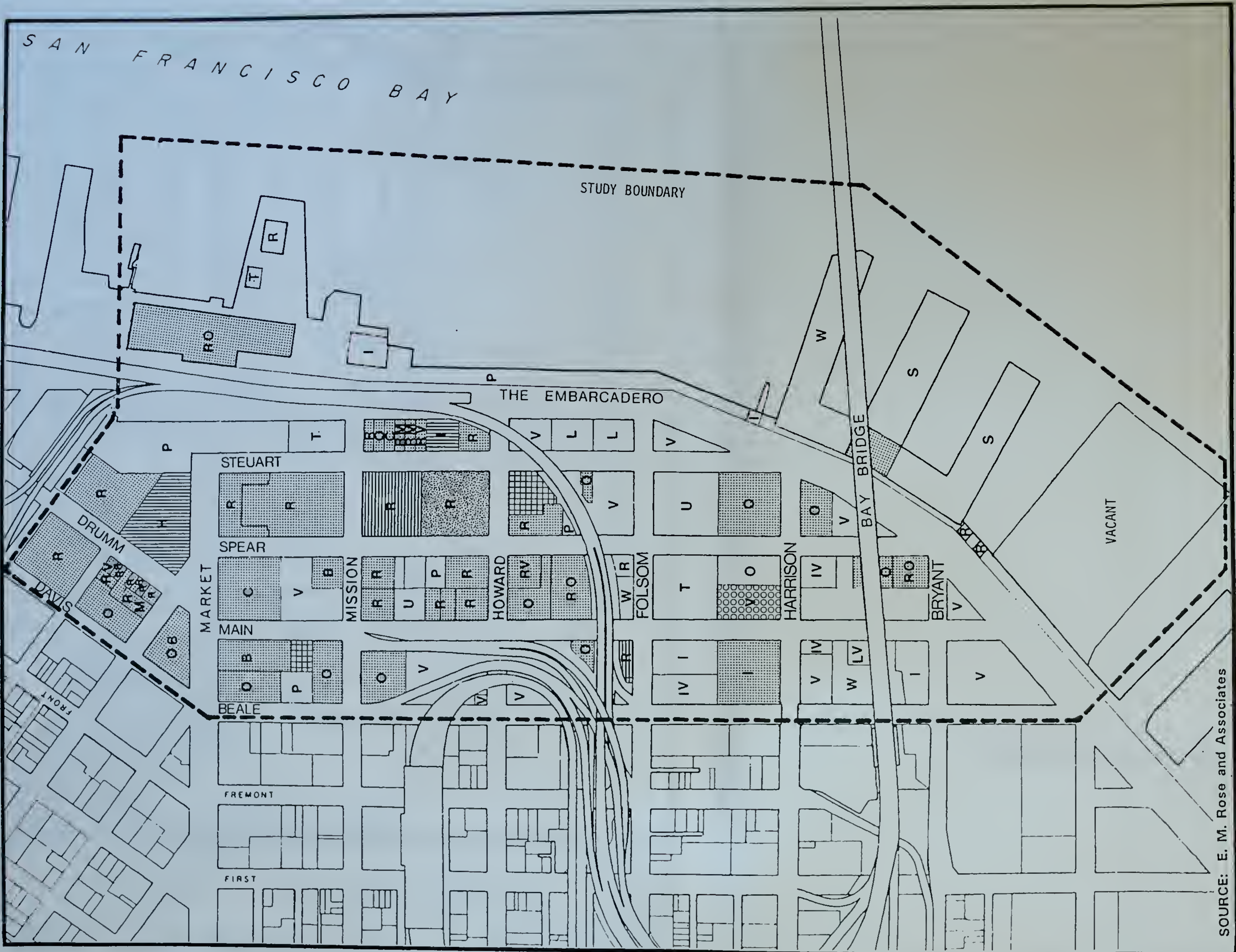
SOURCE: E. M. Rose and Associates

FIGURE 3.1-1 LAND USE STUDY AREA

▨ PROJECT AREA

– – – STUDY AREA

800 FEET


SAN FRANCISCO BAY
STUDY BOUNDARY
THE EMBARCADERO
STEUART
SPEAR
MAIN
BEALE
FREMONT
FIRST
DRUMM
DAVIS
FRONT
MARKET
MISSION
HOWARD
FOLSOM
HARRISON
BRYANT
BAY BRIDGE
VACANT

SOURCE: E. M. Rose and Associates

FIGURE 3.1-2 LAND USE MAP

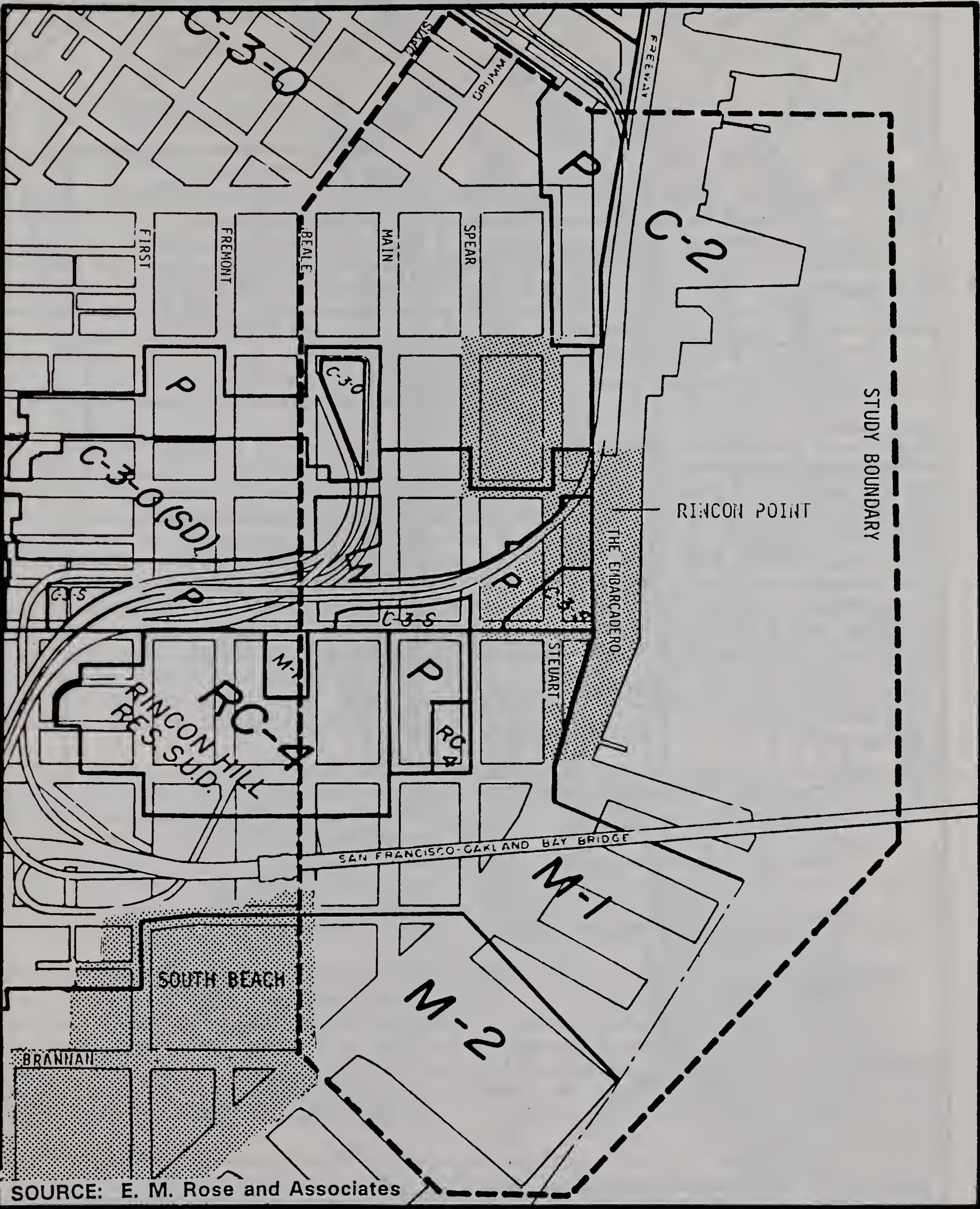
GROUND FLOOR USE

O	OFFICE
W	WHOLESALE / WAREHOUSE
R	RETAIL / RESTAURANT
P	PARK / PLAZA
F	FURNITURE STORE
B	BANK
T	TRANSIT
H	HOTEL
I	INSTITUTIONAL
M	MEDICAL CLINIC
V	VACANT LAND / SURFACE PARKING
C	CULTURAL
L	LIGHT INDUSTRIAL
U	UNDER CONSTRUCTION
S	SHIP SERVICES / REPAIR

UPPER FLOOR USE

▨	OFFICE
▨	RESIDENTIAL
▨	VACANT
▥	HOTEL
▦	PARKING STRUCTURE
▤	RETAIL

500 FEET


C-3-O
DAVIS
DRUMM
FREEWAY
P
C-2
FIRST
FREMONT
BEALE
MAIN
SPEAR
C-3-O
P
STUDY BOUNDARY
C-3-O (SD)
RINCON POINT
THE EMBARCADERO
C-3-S
P
P
C-3-S
C-3-S
M-1
P
RC-4
RINCON HILL RES. S.U.D.
RC-4
STEUART
SAN FRANCISCO-OAKLAND BAY BRIDGE
M-1
SOUTH BEACH
M-2
BRANNAN

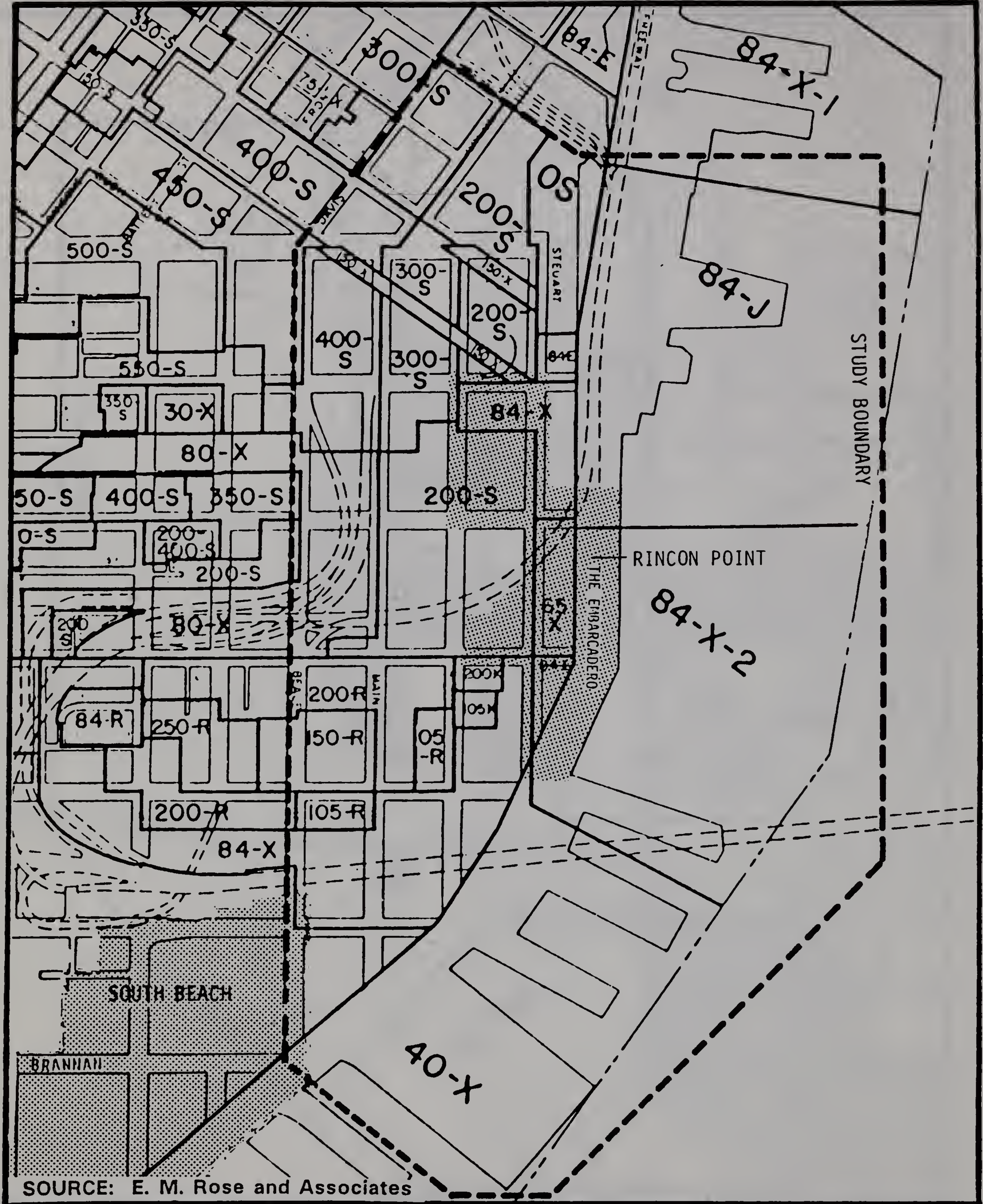
SOURCE: E. M. Rose and Associates

FIGURE 3.1-3 ZONING MAP

C-2 , C-3-O	COMMERCIAL
M-1 , M-2	INDUSTRIAL
P	PUBLIC
RC-4	RESIDENTIAL-COMMERCIAL
▨	S.F.R.A. PROJECT AREAS (DESIGNATED ZONING SUPERSEDED)

SOURCE: CITY & COUNTY OF SAN FRANCISCO

600 FEET


350-S
300-S
84-E
84-X-1
400-S
450-S
OS
200-S
500-S
300-S
200-S
STEUART
84-J
400-S
300-S
550-S
350-S
30-X
84-X
80-X
STUDY BOUNDARY
50-S
400-S
350-S
200-S
0-S
200-400-S
200-S
RINCON POINT
THE EMBARCADERO
84-X-2
200-S
80-X
65-X
200-R
MAIN
200-X
105-X
84-R
250-R
150-R
105-R
200-R
105-R
84-X
SOUTH BEACH
BRANNAN
40-X

SOURCE: E. M. Rose and Associates

FIGURE 3.1-4 HEIGHT AND BULK MAP

OS OPEN SPACE DISTRICT

NUMBERS ARE HEIGHT LIMITS IN FEET

00-Z – LETTER SYMBOLS REFER TO BULK LIMITS IN CITY PLANNING CODE SEC. 270

▨ S.F.R.A. PROJECT AREAS (DESIGNATED HEIGHT AND BULK SUPERSEDED)

SOURCE: CITY & COUNTY OF SAN FRANCISCO

800 FEET

3.1.2 EXISTING LAND USES

SOUTH OF MARKET

Market Street is the break between the regular pattern of small, square blocks arranged in a north-south grid of the northeastern quadrant of the city and the South of Market corridors of long blocks running southwest-northeast. Whereas the North of Market business district is scaled to pedestrian movement, the South of Market blocks have traditionally been oriented to the movement and assembly of goods between the waterfront and rail and road corridors moving across the former Bay flats toward the center of the city and down the Peninsula. Private and public redevelopment efforts over the last 20 to 30 years are changing the South of Market land uses to medium- to high-rise office and high-density residential.

The Ferry Building is the principal use east of The Embarcadero at the foot of Market Street. The importance of this location places the Ferry Building area in a key transitional area between waterfront, office and industrial land uses. There are four zones in the Ferry Building area which provide the transition from water to the high-rise development to the west. At the water's edge there are three major structures in the Turnaround Project area: the Agriculture Building, the Ferry Building, and the BART platform. The Agriculture Building and the Ferry Building are presently in office, restaurant and retail uses. Much of the BART platform area east of the Ferry Building has been leased by the Port to the Ferry Plaza and the Sinbad Restaurants and to the Golden Gate Ferry Terminal. National Auto Rental leases space north of the Ferry Building. Metered parking areas are adjacent to the Ferry Building east of The Embarcadero.

Inland of the Port facilities, the Embarcadero Freeway overhead and the Embarcadero Roadway at grade level constitute a roadway zone that includes the Belt Line Railway and three lanes of surface parking that are bordered on either side by two to three lanes of roadway. The third zone inland is comprised of a 100-foot band of low-rise and open space uses separating the roadway from the high-rise district. The Justin Herman Plaza is in this third zone north of Market. The East Street Row and the MUNI bus turnaround are south of Market. The high-rise district begins immediately beyond this zone.

Between the Ferry Building and the South Beach area, the Port of San Francisco facilities are in various conditions. Piers 14, 18, 20 and 22 were condemned and demolished as a part of the waterfront Promenade project. Pier 22-1/2, the San Francisco Fireboat Station is an active San Francisco Fire Department facility. Pier 24 is currently utilized for warehouse and storage operations. Piers 26 and 28 are currently utilized for ship service and repair operations. Pier 30-32, although in good condition, is vacant and not in regular usage.

West of The Embarcadero, the block bound by Mission, Howard, Steuart and The Embarcadero consists of a number of historic buildings called the East Street Row. East Street was the waterfront street running from Jackson to Folsom, or part of the Eddy Survey (OLD) Seawall. East Street was incorporated into the Embarcadero port facilities and roadway with the construction of the New Seawall. This block includes the Audiffred Building (110-116 The Embarcadero), the East Street Improvement Company (128-132 The Embarcadero), the Hihn/Meyer Building (137-146 The Embarcadero), the Embarcadero Inn (144-146 The Embarcadero) and the Embarcadero YMCA. With the exception of the YMCA, this block is predominantly retail on the ground floor with office space above. Adjacent to the YMCA building is Bay Side Plaza, a recent seven-story office building that is a part of Rincon Point Redevelopment Project area.

The Rincon Point Redevelopment Project area includes a four-block area along The Embarcadero between Mission and Harrison Streets. The former Rincon Annex Post Office is currently undergoing redevelopment for retail and residential usage. The portion of this redevelopment area south of the elevated freeway structure includes the Seaman's Institute building and surface parking areas west of Steuart Street. East of Steuart is a surface parking lot and an adjoining wood frame vacant structure which are located on the Port of San Francisco's property. Adjacent to the Port's property is the Marine Terminal Corporation building. This warehouse-type structure houses a maritime-related (stevedoring) business which hires longshoremen and clerical staff for work on some of the piers. Most of the remaining Rincon Point Project Area consists of portions of the Promenade and the Embarcadero Roadway.

The Hills Brothers Coffee building and property is located in the block south of Folsom between Steuart and Spear Streets. This development project, under construction, rehabilitates and converts the historic building into all office use, totaling about 217,000 gross square feet of office space and 100 parking spaces in the existing basement. New construction will add about 370,000 gross square feet of office space; 40,000 gross square feet of ground-level retail space; 85 residential units (85 units); and 500 parking spaces located in the basement level beneath the mixed-use building.

Rincon Hill serves as the western anchorage of the Bay Bridge. Land uses in the hill area are rapidly changing from office support and light industry to secondary office uses. The lot by lot mix of office support and office uses has become characteristic of the area.

The South Beach Redevelopment Area adjoins the southern boundary of the study area. The portions of the redevelopment project which are adjacent to the study area include Bayside Village, a 650-unit residential complex under construction, and the Delancey Street Embarcadero Square Project. The Delancy Street project, under construction, includes 155 residential units and neighborhood commercial. These new developments look directly onto The Embarcadero. Other development projects, including the small boat harbor at the foot of King Street, are noted by Figure 3.1-5.

Other portions of the land use study area south of Market Street are more intensively developed land uses. West of Steuart Street, the blocks bounded by Market and the elevated Embarcadero Freeway structure have been developed into a South of Market high-rise office district. However, along much of the Embarcadero Roadway, the 40-foot and 84-foot height limits have preserved a transition zone between the office towers and the waterfront. The study area contains a mixture of architecturally and historically significant buildings.

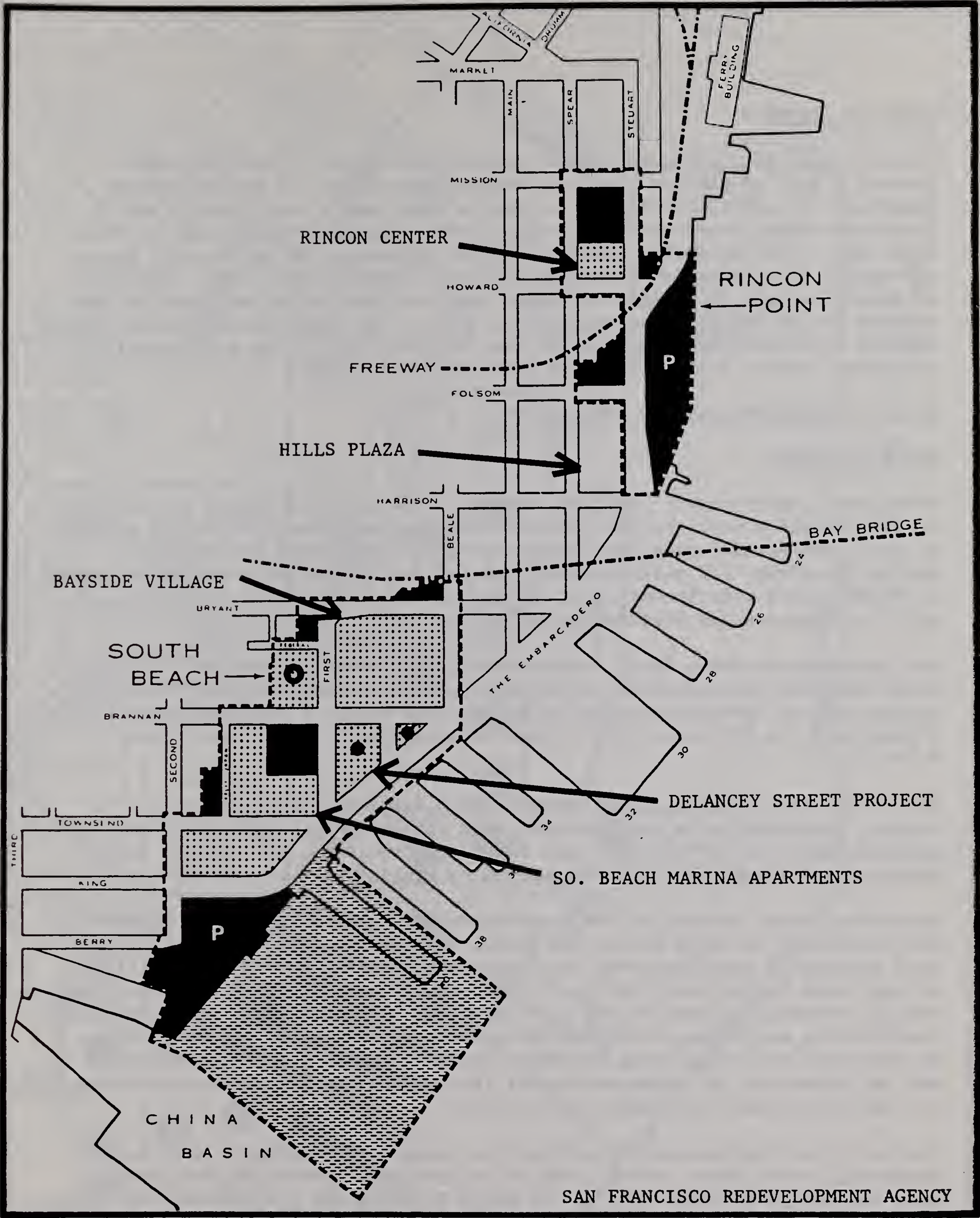

CALIFORNIA
DRUMM
MARKET
MAIN
SPEAR
STEUART
FERRY BUILDING
MISSION
RINCON CENTER
HOWARD
RINCON POINT
P
FREEWAY
FOLSOM
HILLS PLAZA
HARRISON
BEALE
BAY BRIDGE
24
BAYSIDE VILLAGE
BRYANT
THE EMBARCADERO
26
SOUTH BEACH
FIRST
28
BRANNAN
SECOND
30
DELANCEY STREET PROJECT
32
TOWNSEND
34
THIRD
KING
SO. BEACH MARINA APARTMENTS
BERRY
P
38
CHINA BASIN
SAN FRANCISCO REDEVELOPMENT AGENCY

FIGURE 3.1-5 SFRA REDEVELOPMENT PROJECT AREAS

RESIDENTIAL
COMMERCIAL
P MAJOR PARK
SMALL BOAT HARBOR
● NEIGHBORHOOD COMMERCIAL
○ LIGHT INDUSTRY
PROJECT BOUNDARY
800 FEET

SOURCE: SAN FRANCISCO REDEVELOPMENT AGENCY

NORTH OF MARKET

Three of the North of Market blocks contain buildings of the Embarcadero Center, a part of the San Francisco Redevelopment Agency's Golden Gateway Complex. Two additional high rises, and a small scale traditional line of structures along Drumm and California Streets complete the North of Market land uses. The California Street cable car turnaround at California, Drumm and Market is a major San Francisco National Historical Monument. The North of Market project study area is almost completely built to the capacity that current zoning and planning regulations allow. The Embarcadero Center, Mutual Benefit Life Building and the Union Bank Building are in the most densely developed blocks in the MUNI Metro Turnaround study area.

3.1.3 TRENDS AND PLANNED LAND USES

SOUTH OF MARKET

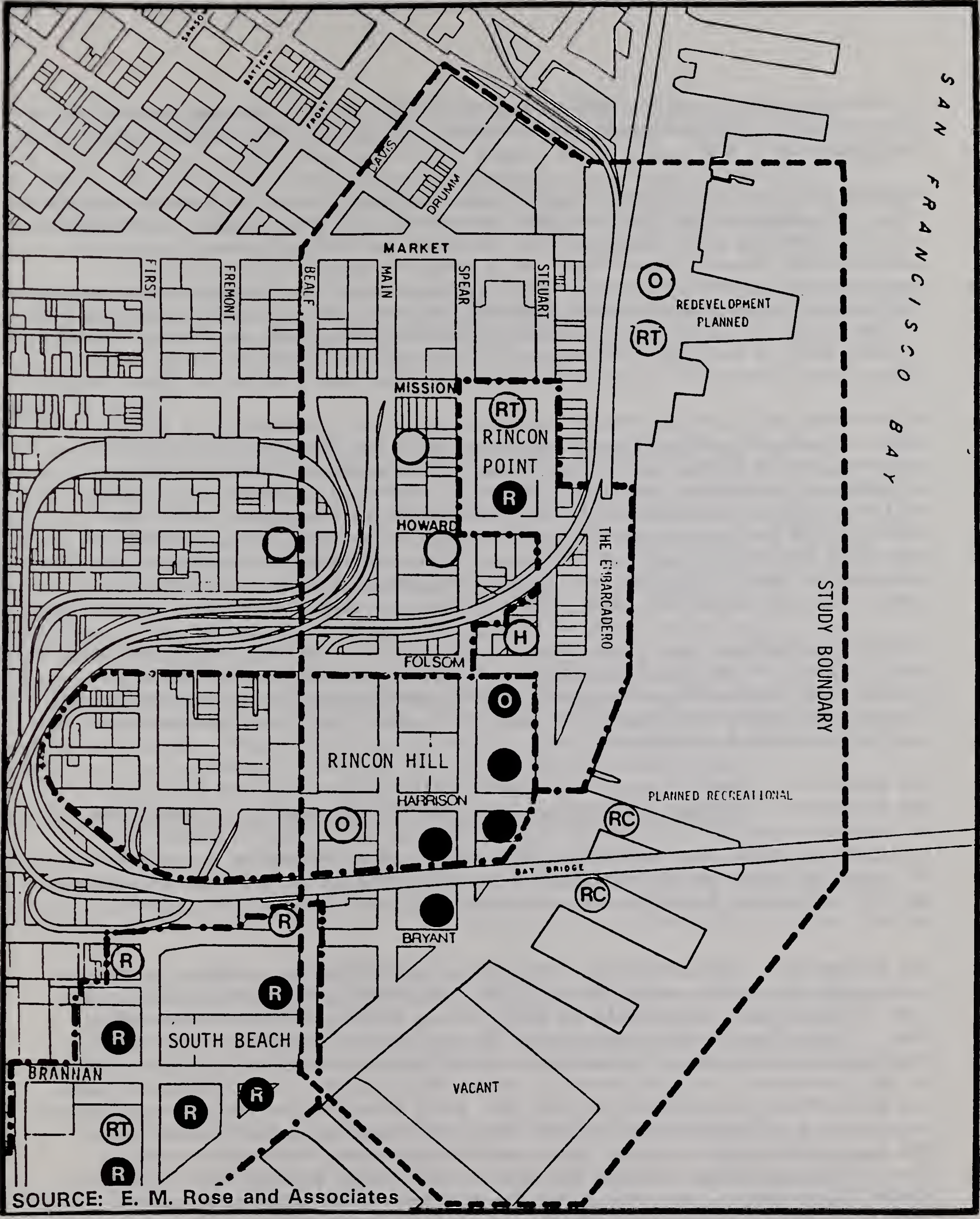
There have been dramatic land use changes in the south of Market Street area in San Francisco over the past decade. Current development activity, proposed projects and special area plans point to even more changes for the area. During the 1970s, 9.2 million square feet of new office space was built south of Market; this constitutes about 60 percent of all new major office space built in downtown San Francisco over that period.

The Rincon Point-South Beach Redevelopment Projects will contribute to this trend with the redevelopment of vacant or underutilized lands into 1,182,000 square feet of commercial space, 2,554 dwelling units, a 690-berth marina, a hotel and 514,000 square feet of public access/park spaces (see Figure 3.1-5).

The South Beach subarea of the Redevelopment Project (see Figure 3.1-6) is rapidly developing as a neighborhood, with residential, neighborhood commercial, park and recreational uses under construction. Most of the South Beach Redevelopment area will be devoted to high-density residential uses.

The Rincon Point subarea of the Redevelopment Project will include commercial, hotel, housing and park uses. The Postal Service has relocated most of its mail processing functions from the Rincon Annex building to a new facility in the India Basin Industrial Park. The Rincon Annex building has been historically restored and much of the space made available for adaptive commercial reuse with a new 300-unit residential structure. The hotel may include 400 to 800 units at a site along the Embarcadero Roadway. Private redevelopment of industrial or warehouse spaces into office and retail uses accounts for additional South of Market projects.

The Ferry Building complex is perhaps the largest redevelopment opportunity remaining in the Market Street area of the project. Proposals have been made that would renovate most of the Ferry Building and portions of the Agriculture Building with office, restaurant, retail and public uses. Piers 24 and 26 may be developed, under current proposals, into an international yachting center for recreation and public access on the South of Market waterfront. Port plans were to redevelop Piers 30-32 into a container freight facility; however, the Port is currently considering other uses for the location.


SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
RINCON POINT
HOWARD
FOLSOM
RINCON HILL
HARRISON
BAY BRIDGE
BRYANT
SOUTH BEACH
BRANNAN
VACANT
THE EMBARCADERO
REDEVELOPMENT PLANNED
PLANNED RECREATIONAL
STUDY BOUNDARY
SAN FRANCISCO BAY
O
RT
R
H
RC

SOURCE: E. M. Rose and Associates

FIGURE 3.1-6 CUMULATIVE MAP

OFFICE CONVERSIONS	OFFICE CONSTRUCTION	RESIDENTIAL CONSTRUCTION	RETAIL CONSTRUCTION	HOTEL CONSTRUCTION
○ PLANNED	Ⓞ PLANNED	Ⓡ PLANNED	(RT) PLANNED	Ⓗ PLANNED
● COMPLETED 1985-88	O COMPLETED 1985-88 UNDER CONSTRUCTION	R COMPLETED 1985-87 UNDER CONSTRUCTION	RT COMPLETED 1985-87 UNDER CONSTRUCTION	

800 FEET

In addition, there are currently two other major projects planned which involve major new uses with area-wide significance: the Mission Bay proposal and the Rincon Hill Plan.

Mission Bay is a major redevelopment proposal south of the Turnaround Project area. The Mission Bay Plan has been prepared by the San Francisco Department of City Planning in conjunction with the Santa Fe Realty Corporation. An Environmental Impact Report (EIR) is in progress which assesses potential impacts for a variety of development alternatives for the Mission Bay area. The Mission Bay Project Area encompasses 300 acres along the eastern shoreline of San Francisco. The eastern border runs from King Street to Seventh Street (I-280) down to Mariposa; the western border varies from Third Street to China Basin Street and includes the bayfront immediately south of China Basin.

Mission Bay Draft Environmental Impact Report (DEIR), published in August 1988, details two alternatives. Alternative A, the mixed-use development proposal, would have about 7,700 housing units, eight million square feet of office, commercial, and light industrial space, and a 500-room hotel at build-out, 2020. Alternative B, the maximum housing proposal, would have about 10,000 housing units, 1.72 million square feet of office, commercial, and light industrial space at build-out, 2020. The Mission Bay No Project Alternative would allow the area to develop gradually into a predominantly commercial and industrial area under existing M-2 (Heavy Industrial) zoning.

Reference should be made to the Mission Bay DEIR for further project details and a discussion of the alternative land use plans. Implementation of the Mission Bay development plans would require amendments to the City Master Plan and zoning ordinance through approval by the City Planning Commission and the Board of Supervisors.

The Rincon Hill Plan, a part of the Master Plan of the City and County of San Francisco, proposes to induce private development capital to transform an underutilized South of Market industrial area into a new high-density residential community. The Rincon Hill Plan covers an area of approximately 55 acres encircled by the portions of the Embarcadero Freeway and the western portion of the Bay Bridge structure which is located immediately adjacent to the project study area.

The Rincon Hill Plan proposes a combination of residential, commercial, industrial, and open space uses. Up to 7,500 residential units and 932,000 square feet of commercial space could be added to the Rincon Hill area under this plan. Public and private investments in the form of residential and San Francisco Bay waterfront recreational amenities will provide an added stimulus to the Rincon Hill redevelopment efforts. These primary developments include the Hills Plaza development project, the South Beach-Rincon Point Redevelopment Project, and the proposed Waterfront Park and Embarcadero Roadway projects. The San Francisco City Master Plan revisions proposed in the Rincon Hill Plan include new land use classifications, new height map and bulk controls, street improvements, new public and private open space requirements, and specific setback controls to create a residential streetscape.

The City of San Francisco, as of June 1988, has received two proposals for redevelopment consistent with the Rincon Hill Plan. These two proposals are for a total of 350 housing units with ground floor commercial. The timing of additional Rincon Hill redevelopment depends on San Francisco housing market conditions (telephone interview; Lois Scott, Department of City Planning, June 27, 1988). Figure 3.1-7 illustrates the land use plan and the publicly accessible open space opportunities presented in the Rincon Hill Plan.

Together these projects constitute planning for a major shift of the South of Market corridor between lower Market Street and China Basin from industrial, warehouse, marine and secondary office support uses to more intensive office uses, high-intensity housing and commercial uses.

NORTH OF MARKET

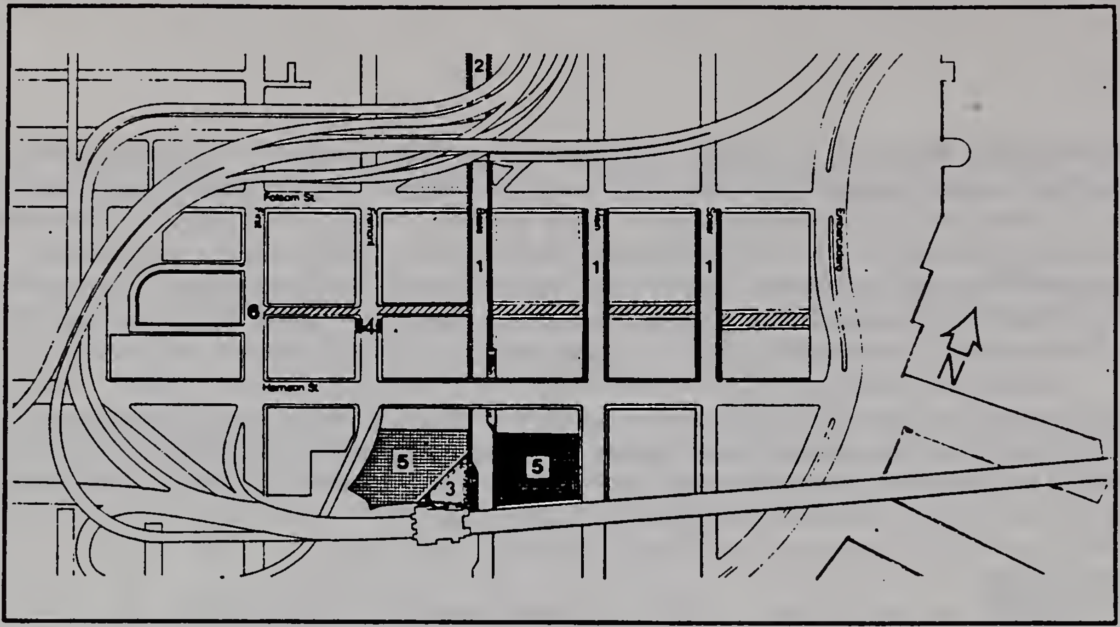
The North of Market portion of the study area is almost completely built to the capacity allowed by current zoning and planning regulations. Three blocks of the study area north of Market are within the Golden Gateway Redevelopment District which encompasses approximately ten blocks north of Market Street in the Embarcadero Center area. With the completion of Golden Gateway Commons III in 1983, very few development opportunities remain in the study area north of Market or areas immediately adjacent to the study area. The Golden Gateway project includes four mid-rise (22 to 25 story) apartment buildings, three blocks of low-rise townhouses and office structures, a 2.5-acre park, 240,000 square feet of office and retail space, and 930 parking spaces. Adjacent to the northern boundary of the study area, Pier 3 is used for storage space. The Klamath and Santa Rosa historic ships are moored at the pier and used as office space. Pier 5 is in substandard condition and is now vacant. Pier 7 is in poor condition and is used as surface parking. The Port plans to remove this pier and build a public fishing pier.

3.1.4 RELATIONSHIP OF LAND USE TRENDS TO TRANSPORTATION PROJECTS

When the study area and South of Market trends and planned land uses are considered with existing uses and current development activity, these projects are strong indicators of several major trends relevant to the Turnaround Project:

- Land values have generally increased during the past decade. Rising prices are overshadowing existing structural values and causing intense pressure for redevelopment. In the South of Market area, many older three- and four-story buildings exist at a fraction of the allowable intensity and height in an area easily accessible to the Market Street corridor.

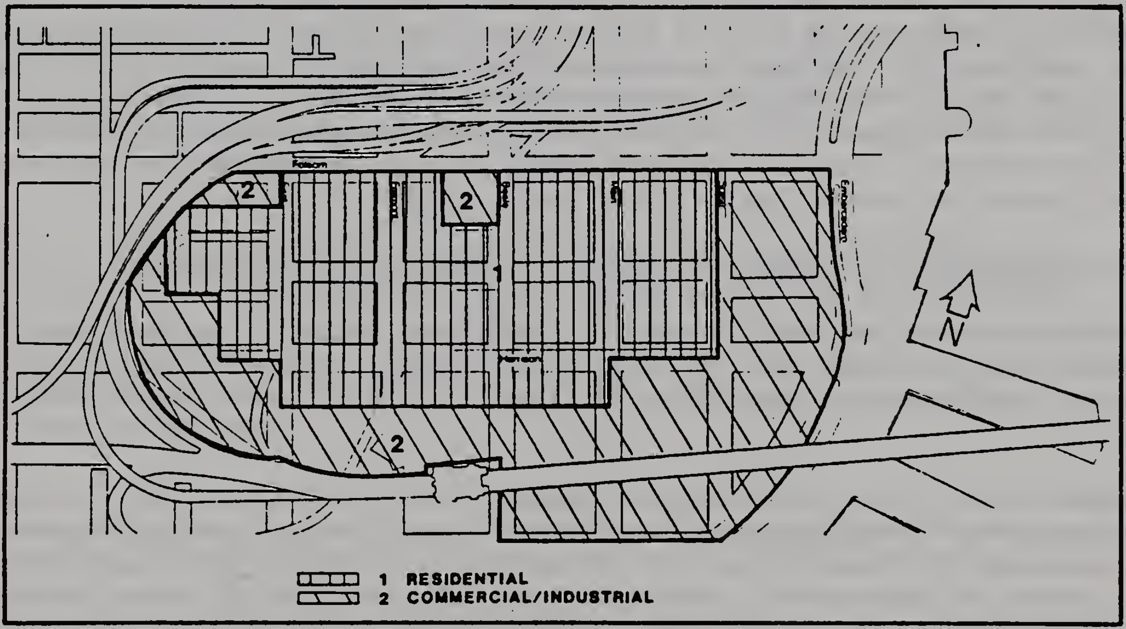
- Industrial uses are being forced out of the Howard to Townsend Street corridor by rent pressure and many are moving to new industrial spaces south of China Basin, in the India Basin and Hunter's Point areas.


2
Folsom St.
First
Fremont
Beale
Main
Spear
Embarcadero
1
1
1
6
4
Harrison St.
5
3
5
N

PUBLICLY ACCESSIBLE OPEN SPACE OPPORTUNITIES

LEGEND:

1. SIDEWALK WIDENING, STREET BEAUTIFICATION
2. SIDEWALK WIDENING, STREET BEAUTIFICATION, TO CREATE PEDESTRIAN CORRIDOR TO FINANCIAL DISTRICT.
3. PRESERVE OPEN SPACE AROUND BAY BRIDGE ANCHORAGE
4. CREATION OF WIDE PEDESTRIAN OVERPASS
5. RECREATION FACILITIES ON ROOFTOPS OF POTENTIAL INTERCEPT PARKING STRUCTURES
6. CREATION OF A PEDESTRIAN STREET NETWORK


Folsom
2
Fremont
2
Beale
Main
Spear
Embarcadero
1
Harrison
2
N
▤ 1 RESIDENTIAL
▨ 2 COMMERCIAL/INDUSTRIAL

LAND USE PLAN

In Block 3766, Lot 5 along Beale Street is situated in a hollow and is a suitable site for a parking facility. The Residential category applies to the northern portion of this lot only at a level equal to or above the elevation of Harrison Street.

FIGURE 3.1-7 RINCON HILL MAP

SOURCE: San Francisco Department of City Planning

- The new uses being introduced to the area are more population intensive than the declining industrial uses. Office and commercial uses have much higher daytime worker and customer populations than industrial uses, and the proposed high-intensity residential and hotel uses will introduce night and weekend activity in an area that has been largely abandoned after work hours.

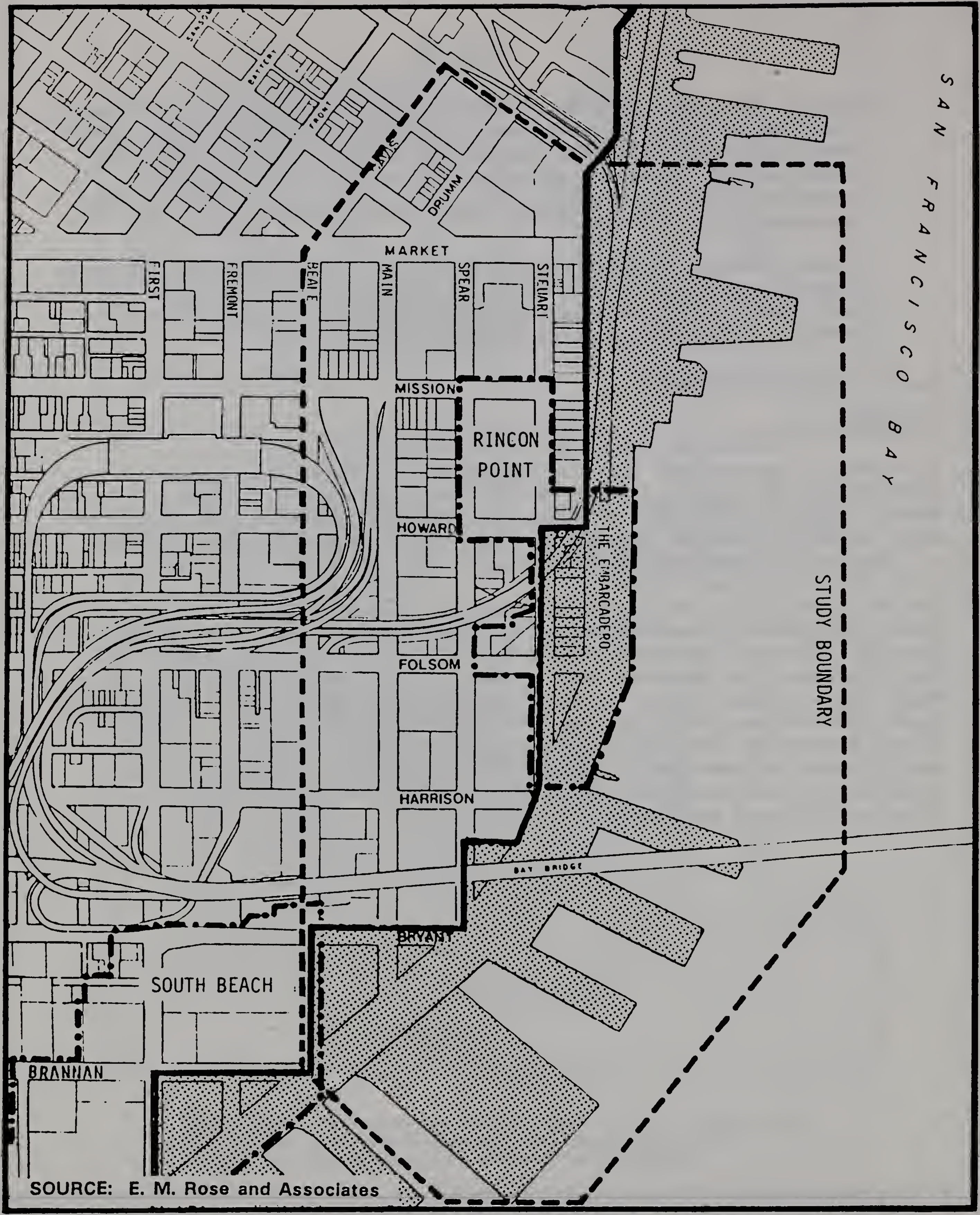
- These land use, economic and social changes will decrease use of large transport vehicles to move goods and materials along east/west corridors and increase individual trips in private automobiles and by transit, along predominantly north/south routes.

3.1.5 PLANS AND POLICIES

OVERVIEW

A variety of governmental actions, approvals and funding allocations are required for the construction of the MUNI Metro Turnaround facility. Federal, State, regional, and City and County plans and policies affecting the project area as well as required permits and approvals are summarized in Appendix 6. Figure 3.1-8 shows San Francisco agency jurisdictions.

The following discussion focuses on those agencies most directly affected by the MUNI Metro Turnaround Project. These agencies include the San Francisco Municipal Railway, the San Francisco Redevlopment Agency and the Port of San Francisco. The Municipal Railway Capital Improvement Program, and Short Range Transit Plan, the San Francisco Redevelopment Agency Rincon Point-South Beach Redevelopment Plan, and the Port of San Francisco Maritime Strategy II and Resolution 87-96 are discussed in detail below. Other agency plans and policies as summarized in Table 3.1-2 are discussed in further detail in Reference Document 9, San Francisco Municipal Railway Turnaround Project Plans and Policies Report.


SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
RINCON POINT
HOWARD
FOLSOM
HARRISON
BRYANT
BAY BRIDGE
SOUTH BEACH
BRANNAN
THE EMBARCADERO
STUDY BOUNDARY
SAN FRANCISCO BAY
800 FEET

SOURCE: E. M. Rose and Associates

FIGURE 3.1-8 SAN FRANCISCO AGENCY JURISDICTIONS

- ▭ SAN FRANCISCO REDEVELOPMENT AGENCY
- ▨ SAN FRANCISCO PORT COMMISSION

MUNICIPAL RAILWAY/PUBLIC UTILITIES COMMISSION

Capital Improvement Program, 1987-1992. The San Francisco Municipal Railway "Capital Improvement Program, 1987-1992," ranks the Metro Turnaround Project as MUNI's number one capital priority. After Metro operation began in 1980, ridership on the LRV system exceeded even the most optimistic projections made during the planning and construction phases. Construction of the Metro Turnaround will increase the capacity of the MUNI Metro subway.

Short Range Transit Plan, 1987-1992. The San Francisco Municipal Railway Short Range Transit Plan, 1987-1992, lists the Metro Turnaround as the agency's number one capital improvement project. The project will increase Metro capacity and temporary storage area for disabled vehicles as well as facilitate the proposed Metro Extension to the China Basin area.

The Department of Public Words (DPW) is the lead agency for the planning, design and construction of the Embarcadero Roadway Project. This is a program to replace the existing Embarcadero Roadway; the proposal was developed as part of the I-280 Transfer Concept Program. The Turnaround Project surface facilities will be in the median of the Roadway. Specific DPW-enforced regulations applicable to the Turnround Project construction are:

Noise Ordinance. Construction projects in San Francisco must conform to the requirements of the San Francisco Noise Ordinance. The ordinance requires that all powered construction equipment, except impact tools and equipment, emit not more than 80 dBA measured at 100 feet.

Procedure for Hazardous Wastes Soil Analysis. San Francisco regulations require the preparation of a site history to investigate hazardous waste soil contamination before a building permit can be issued. The site history is to contain a written site history description and a soil analysis report. The soil analysis report must indicate if any soil contamination exists that exceeds Federal and/or State Applicable or Relevant and Appropriate Requirements (ARARs). If contamination beyond ARAR standards is found, a mitigation process must be undertaken before a building permit can be issued. The Director of Public Health determines if the report is unacceptable within 30 days of submission to DPW and the Director of Public Health.

PORT OF SAN FRANCISCO

Maritime Strategy II, 1979. The San Francisco Port Commission has exclusive powers under the 1968 Burton Act to manage, and operate the Port of San Francisco lands according to the provisions of the Charter of the City and County of San Francisco, the 1968 Burton Act Transfer Agreement and the regional and local waterfront agency plans and policies. The Port of San Francisco consists of 6.5 linear miles of waterfront from Fort Mason to Hunters Point Naval Shipyard, certain adjacent New Seawall created lots and certain land designated "Port Priority Use" land under the Seaport Plan.

Port plans and policies are articulated in several documents: Maritime Strategy II, the Maritime Master Plan for the Southern Waterfront; the Seaport Plan; the Central and Northeastern Waterfront Plans; the Special Area Plan for the San Francisco Waterfront; and the Total Design Plan, Piers 7 to 24.

The main goal of the Port Commission in the Turnaround Project area is to optimize the development of the northeastern waterfront for uses compatible with the BCDC Special Area Plan for the San Francisco Waterfront and the Total Design Plan, Piers 7 to 24, and the City's Northeastern Waterfront Plan. Port development would maintain a proper balance of maritime, nonmaritime and public uses. The revenues generated from office, commercial and recreational uses are utilized to support growth and modernization of the Port's southern waterfront and in the Fisherman's Wharf area.

Waterfront planning for Port of San Francisco lands is done through a joint planning effort of the City and the Bay Conservation and Development Commission. The northern area down to China Basin is covered by the Northeastern Waterfront Plan. Maritime Strategy II includes all Port lands (Port Commission of the City and County of San Francisco: Official Statement Relating to Revenue Bonds, 1984, page 11).

The MUNI Metro Turnaround Project area is a part of the Port of San Francisco jurisdiction for the two blocks of Steuart from the top of Howard Street and for any portions of the Turnaround extending onto The Embarcadero at or near Harrison Street. The Port includes this land in a planning and land use zone, extending from Piers 7 to 24, identified as urban waterfront recreational and open space (page 10). Piers 22-1/2 and 24 would be the only piers between the Bay Bridge and the Ferry Building according to Maritime Strategy II. Current proposals call for developing Piers 24 to 26 into an international vachting center. Pier 22-1/2 will continue as the fireboat/firehouse station. Piers 5 and 7 are planned for removal to build a public fishing pier. Additionally, the Port has approved a lease for Piers 15-17 and has removed Pier 14.

In the Total Design Plan, Pier 24 is to be developed a commercial recreation complex with shops, restaurants, entertainment, public assembly and open space uses. Inland of the recently developed Promenade and bayside of the new Embarcadero Roadway alignment, a new six-acre park is to be created as part of the Rincon Point-South Beach Redevelopment Area (page 17).

Resolution No. 87-96. San Francisco Port Commission Resolution No. 87-96 establishes policies and procedures for review, approval and mitigation of interagency and publicly sponsored projects on Port lands. For major projects, review and approval is required at three stages:

- Schematic design review,

- Working design review, and

- Final review/contract documents.

All proposed Port property projects shall be reviewed for potential impact on Port operations. Port policy requires compensation, at fair market value, for the loss of revenues and/or the value of land. It is the policy of the Port Commisssion "to have a replacement of lost land uses, supply of parking and compensation for increases in maintenance costs associated with projects proposed on Port land by another party(ies) (pages 1, 3). The Port is responsible for consulting with the State Lands Commission to establish conformance with the public trust provisions.

SAN FRANCISCO REDEVELOPMENT AGENCY

Rincon Point-South Beach Redevelopment Plan, 1980. The project area block of Mission-Howard-Steuart-Spear, and the parcel bounded by the Embarcadero Freeway structure-Folsom-Spear-Steuart, are within the Rincon Point-South Beach Redevelopment Area. The redevelopment area includes a proposed park between Howard-Harrison-Steuart and the Port of San Francisco Bulkhead line. Additional portions of this San Francisco Redevelopment project extend from Beale and Bryant to the Bulkhead line. The eastern boundary of this section runs down to First and Bryant and zig-zags to China Basin at the line of Second Street, and includes Piers 46A, 44, 42 and 40 (see Figure 3.1-5).

The Rincon Point-South Beach project includes the creation of a 6.5 acre waterfront park by rerouting The Embarcadero onto Steuart Street right-of-way between Howard and Harrison Streets. The Redevelopment Plan features residential development on the Howard Street end of the Rincon Annex Post Office site; rehabilitation of the Annex as commercial and office space; office development at Howard and Steuart on the south end of the East Street row; and a 700-room hotel near the Embarcadero Freeway fronting on Folsom between Main and Spear Streets. A total of 2,554 housing units and 1,182,000 square feet of commercial space is planned for this redevelopment area. The Rincon Point-South Beach Redevelopment Plan encourages the construction of the MUNI Metro rail service extension into the area.

3.2 SOCIAL AND COMMUNITY CHARACTERISTICS

3.2.1 POPULATION AND AFFECTED SOCIAL GROUPS

DEMOGRAPHIC CHARACTERISTICS

The City's 1985 residential population was 718,500 and although the number of San Francisco residents has increased since 1980, the number remains far short of the 1960 population of 740,300. As shown in Table 3.2-1, the population is expected to surpass the 1960 population level and increase to over 780,000 by 2005.

Similarly, study area population has begun to increase after 20 years of decline (see Tables 3.2-2 and 3.2-3). The population in the study area is also expected to increase steadily through 2005. The increase reflects the housing developments proposed and currently under construction in the area.

For specific age groups, the study area population varies from citywide statistics. For example, in 1980 those under 18 years represented 4 percent of the study area population, whereas citywide the percentage was 17 percent. Conversely, the percentage of seniors (60 years and older) living in the study area was significantly higher than the citywide percentage, 32 percent and 20 percent, respectively. In between these two age groups, study area and citywide percentages were much more consistent. 64 percent of the study area population was in the 19 to 59 age category compared with 62 percent of the citywide population.

San Francisco has a large minority population. In 1980, 311,900 residents or 46 percent of the total population were minority. In the study area, the minority population percentage of 41 percent was consistent with citywide percentage. Asians and Pacific Islanders (primarily Filipinos) represented the largest population group at 29 percent. The Black population was approximately 500 or nine percent, and there was a three percent mix of Hispanics and other minorities.

From 1970 to 1985, the citywide median household income more than doubled (from $10,400 to $29,550) at a rate greater than inflation and substantially higher than the nationwide figure of $20,900. Despite this relatively high income level, 20.5 percent or 29,100 families citywide had incomes of less than $10,000. In the study area, the household income in 1985 varied significantly, ranging from a high of $33,900 to a low of $7,142.

TRANSPORTATION DISADVANTAGED

The elderly, the young, the poor, and the disabled do not share the same level of mobility enjoyed by most of the population. As a result they are referred to as transportation disadvantaged as they are dependent on public transportation.

Within the study area, census tract 179 had a high portion (90 percent) of low income and minority residents who had no automobiles. Sixty percent of their trips to work were either by public transportation or walking. Five percent of the population were disabled persons.

TABLE 3.2-1. CITYWIDE POPULATION

1960	1970	1980	1985	1990	1995	2000	2005
740,300	715,800	678,900	718,500	744,000	760,000	773,000	780,700

TABLE 3.2-2. STUDY AREA POPULATION

1960	1970	1980	1985	1990	1995	2000	2005
5,200	4,500	4,200	5,000	7,200	8,400	9,700	10,100

TABLE 3.2-3. POPULATION CHANGE IN STUDY AREA BY CENSUS TRACTS (1960 - 1985)

	POPULATION			
CENSUS TRACT	1960 (1)	1970 (2)	1980 (2)	1985 (3)
115	1,061	1,011	251	275
116	934	1,938	1,597	1,732
117	842	719	1,623	2,062
176	941	315	354	418
179	1,458	554	374	532
TOTAL	5,236	4,537	4,199	5,019

(1) U.S. Census Bureau Source: California Labor and Statistical Library.

(2) U.S. Census Bureau Source: California Labor and Statistical Library.

(3) ABAG Projections 1980-2005, San Francisco by Census Tracts.

3.2.2 HOUSING AND NEIGHBORHOODS

Of the total housing stock in San Francisco, 85 to 90 percent are multi-family units. Between 1985 and 1986, approximately one third of the City's 2,500 new housing units were built within a mile of the Transamerica Pyramid, located at the northern edge of the Financial District at Montgomery and Washington Streets. The City anticipates that, in accordance with this trend, as many as half of all new units will be constructed in the vicinity of downtown.

Housing costs in San Francisco are among the highest in the nation. For example, a two bedroom single family home or condominium can range from $180,000 to well over a million dollars. $250,000 for a two bedroom unit is a median price. For those earning less than $30,000 per year and having the greatest need for housing, the majority of new housing is unaffordable.

City policy has attempted to alter this situation by encouraging construction of mixed income housing. In accordance with this City policy, residential development in the project vicinity is incorporating low and moderate units into large-scale residential complexes. Currently, approximately 2,900 units are under construction or planned to be built in the project area. Of this total, the San Francisco Redevelopment Agency has planned for the construction of 1,670 units. The Agency has issued $162.7 million or 25 percent of total citywide California Senate Bill 99 bonds for housing in the project area. The Redevelopment projects near The Embarcadero, identified in Figure 3.1-5, are:

Bayside Village	840 units
Rincon Center	316 units
South Beach Marina	414 units

The majority, 80 percent, of these units are priced at affordable market rates and 20 percent are moderate income units. (1)

Additionally, Delancy Street Foundation is constructing 177 low income (2) units along The Embarcadero south of Brannan Street, and Hills Plaza at Steuart and Folsom Streets will include 85 residential units.

3.2.3 PUBLIC SERVICES

POLICE SERVICES

The police services in the study area are handled through Southern Station located at the Hall of Justice, 850 Bryant Street. The area is patrolled by car. There are no walking patrolmen in the area.

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(1) Moderate income is defined as 150 percent of citywide median income. For a single person, the level is $44,600. For a family of three, it is $57,300.

(2) Low income is defined as 50 percent below median income or $16,700 for a single person and $21,450 for a family of three.

In recent years there has been an increase in service alarm calls at the new highrises. The majority of these calls have been due to alarms being incorrectly set or the inability to turn the alarms off. There has not been an increase in crime in the area.

FIRE SERVICES

The fire services in the study area are handled through Fire Station 35 at Pier 22 1/2, at the foot of Harrison Street. There is an average of seven firemen on duty. The station has one engine and one fire boat.

In recent years there has been an increase in alarms in the highrises primarily due to the sensitivity of the fire alarm systems in the new buildings. Additionally, there has been a increase in medical response calls due to increased population in the area.

3.3 ECONOMIC AND FINANCIAL CHARACTERISTICS

3.3.1 URBAN ECONOMY

DEVELOPMENT TRENDS

In 1965 the total downtown office space was 26 million square feet. By 1984, total downtown space had increased to 55 million square feet, an increase of 29 million square feet. Roughly one half of this development took place since 1978.

The approval and adoption of the Downtown Plan culminated six years of public debate on development controls. (See Appendix G for summary of the Downtown Plan.) The Plan, which was designed to cut by 60 percent the City's pace of highrise development, was hailed nationally for setting downtown growth limitations. The San Francisco Board of Supervisors adopted the zoning changes embodied in the Plan in September, 1985. The Plan allows approximately 2.85 million square feet of new offices over three years, and places an annual cap on development citywide at 950,000 square feet. The Downtown Plan fees increase the cost to develop in downtown San Francisco by $13.34 per square foot.

In November, 1986, Proposition M was approved by the voters of San Francisco, amending the Office Development Limitation Program of the Downtown Plan. Proposition M changed the annual limitation of office development from 950,000 square feet to 475,000 square feet, as one of its key elements.

Despite the many regulations, limitations and increased developers fees, San Francisco continues to be viewed as a prime location for developers and investors. For example, the downtown office vacancy rate was 18.1 percent in the first quarter of 1987 and declined to 13.85 percent by the last quarter of 1987 (Coldwell Banker, 1988). Some of the vacant spaces, especially in the South of Market area, are being occupied by companies moving from one office to another in San Francisco rather than expansion or relocating businesses from another city. However, new companies, mainly small businesses, and jobs have also developed, such as printing services, office supplies, computer services, messenger services, etc.

EMPLOYMENT TRENDS

In 1987 there were 2.8 million people employed in the nine-county San Francisco region of which 572,000 were employed in San Francisco. The five largest employers in San Francisco in 1987 were:

- University of California, San Francisco - 11,300
- Bank of America - 9,900
- Wells Fargo - 7,500
- Pacific Gas & Electric - 6,800
- Pacific Telesis Group - 6,600

In 1986 approximately 160,600 people were employed and 3,237 companies were located in and around the study area covering zip codes 94105 and 94111* (see Figure 3.3-1). Forty four percent or 1,415 of the companies in this area employed 1 to 5 people; 20% or 646 companies employed 6 to 10 people; and 18% or 594 companies employed 10 to 25 people.

The largest number of employees are in the financial sector (banks, savings and loans, mortgage companies, insurance companies and real estate interests) representing 46,400 employees, 29 percent of the total employed, and 765 businesses. 30,570 employees, 19 percent of the total employed and 1,255 businesses, are in the service sector (law firms, management consultants, public relations, hotels and computer services, etc.).

The proposed 1,100,000 square feet of new office/retail space in the study area would generate approximately 4,400 jobs (some new and others relocating to the study area). The development of the 800 room hotel and the proposed Port of San Francisco projects at Piers 24 and 26, and 30/32 in the study area will generate additional employment opportunities.

3.3.2 FISCAL PROFILES

CITYWIDE

The fiscal 1988-1989 projected budget had the City facing a $172.4 million deficit. According to the State constitution, cities and counties cannot start a new year with an unbalanced budget.

The $172.4 million deficit was a projected deficit, not a real deficit. The City is nowhere near default as New York City and Cleveland were in the 1970s. The City is currently paying its bills and has relatively low long term debt and enjoys a good credit rating.

The City needed to raise additional money or cut costs, or both, prior to July 1, 1988. In order to meet the deficits, a combination of steps were taken that included freezing wages of City employees, layoffs, increasing taxes (sales and business taxes), increasing MUNI fares, and reducing public services (ranging from public works, hospital care, parks, etc.).

Other revenue sources include the following:

(1) Sales Tax: based on a rate of 0.125 percent of gross retail sales;

(2) Utility Users Tax: correlates directly to the users consumption levels of various utilities and is used to offset the cost of providing electricity, gas, water, sewage and telephone services to customers;

---

* To determine employment trends, the study area boundary line was extended beyond the original study area. The extended study area boundary line - incorporates two zip code areas, 94111 and 94105. Zip code area 94111 covers the area between Pier 1 and 35, Sansome, Kearny, Sacramento, Battery, Market. Zip code area 94105 covers Market and 3rd to Folsom, 2nd, Bryant, Beale to Embarcadero to Market.

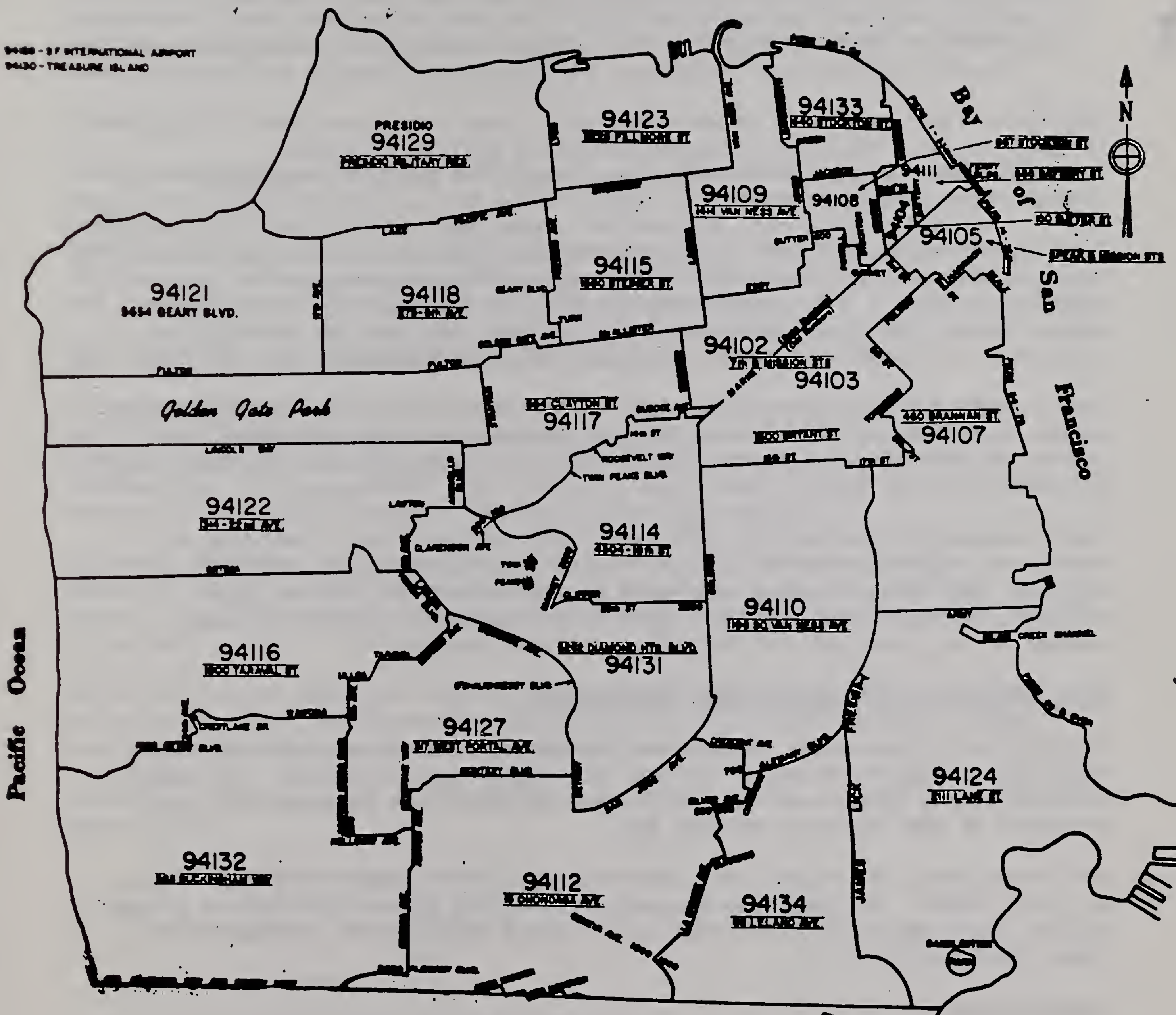

94128 - SF INTERNATIONAL AIRPORT
94130 - TREASURE ISLAND
PRESIDIO
94129
PRESIDIO MILITARY RES.
94123
94133
Bay
N
94111
94109
1444 VAN NESS AVE.
94108
of
94105
94115
94121
5654 GEARY BLVD.
94118
San
Golden Gate Park
94102
94103
94117
CLAYTON ST
94107
460 BRANNAN ST.
Francisco
94122
94114
Pacific Ocean
94110
94116
94131
94127
WEST PORTAL AVE.
94124
94132
94112
94134

FIGURE 3.3-1
SAN FRANCISCO ZIP CODES

(3) Parking Tax: assessed on 20 percent of gross income of parking garage space not reserved for residential use;

(4) Payroll and Gross Receipts Tax: paid in two ways: 1) firms with a tax liability in excess of $500 pay a tax equal to 1.5 percent of their total payroll exceeding $500; and 2) owners of buildings pay a 0.3 percent gross receipts tax on their retail income;

(5) Hotel Tax: 11 percent of gross price per night per room; and

(6) Transfer Tax: assessed at $5/$1,000 per sales price is collected at time of sale of real property.

Tourism is San Francisco's largest industry. Each year, more than $1 billion is spent in San Francisco by approximately 2.4 million visitors, conventioneers and delegates, and approximately $60 million is generated through hotel occupancy taxes.

The City attracted more than 70 major meetings at Moscone Center, more than 40 bookings at Brooks Hall and Civic Auditorium and approximately 400 conventions held at the City's major hotels. Some of the most prestigious annual conventions (e.g., American Trial Lawyers, American Bar Association, and American College of Surgeons) are held in San Francisco.

The citywide hotel occupancy rate in 1986 was 72 percent. At tourist oriented hotels at Fisherman's Wharf, the average occupancy rate was 80 percent and during the summer season it was 100 percent. The average room rate was $80.50 per night.

Total spending by visitors in 1986 was $1,343 million. Total spending by convention attendees staying in San Francisco hotels/motels in 1986 was $347 million. The total spending generated by conventions in 1986 was $576 million. This spending includes spending by attendees staying overnight outside of San Francisco and convention related spending.

MUNI CAPITAL FUNDING SOURCES AND REQUIREMENTS

The MUNI Metro Turnaround Project has the Metropolitan Transportation Commission's highest priority for new rail starts and extensions. As stated previously, the development of the Turnaround Project is essential for the extension of MUNI Metro to Mission Bay.

The project would be funded from UMTA Section 3 funds, State Guideway Funds, and local funds. At least two separate application grants for Section 3 funds will be submitted to UMTA for funding the fixed facility and rolling stock (light rail vehicles).

Federal Funds

SECTION 3. UMTA 3 Section 3 funds, which are discretionary capital grants, are authorized to finance transit capital improvement projects including: (1) the construction of new fixed guideway systems; (2) the acquisition, construction and improvement of facilities and equipment; (3) projects which enhance the effectiveness of mass transportation projects; and (4) the modification of equipment and fixed facilities (other than stations).

Section 3 funds finance 75 percent of the total costs of the project. The remaining 25 percent would be funded from State and local funds.

State Funds

STATE GUIDEWAY PROGRAM. State Guideway Program funds have two funding sources: the State Highway Account funds and the Transportation Planning and Development Act (TP&D) funds. State Highway Account funds are from gasoline tax funds and can be used only to fund fixed guideway facilities. TP&D funds are general funds and can be used for fixed facilities and vehicle rolling stock. These funds could finance roughly half of the 25 percent non-Federal share required for Federal capital grants.

Local Funds

Local match funds come from a minimum of two sources: regionally administered funds, such as Bridge Tolls, and locally administered funds including San Francisco Municipal Railway Improvement Corporation, the Transit Impact Development Fee and Hetch Hetchy net revenues. Local funding could exceed five percent of the total capital funding since they cover all costs that are not grant fundable by Section 3 or State Guideway funds.

MUNI OPERATING FUNDING SOURCES AND REQUIREMENTS

According to the City Charter, MUNI cannot begin a new year with a budget deficit. MUNI's operating needs are projected to exceed its anticipated revenues by as much as $18 million in 1991-1992, depending on the service options that are implemented. As a result, the transit system may have to reduce service and/or increase revenues in the near future.

Wages and salaries are a significant portion of the MUNI annual costs (see Table 3.3-1). In 1981-1982 they accounted for 77 percent; in 1982-1983, 75 percent; in 1983-1984, 77 percent; in 1984-1985, 78 percent; and in 1985-1986, 76 percent.

The major factors that have caused the increased MUNI costs are 1) ongoing costs, accounting for 93 percent of increased costs, and 2) service changes accounting for seven percent of the growth in costs.

Currently, MUNI receives operating revenues from four sources, as indicated in Table 3.3-2.

1. Federal, State and regional subventions

2. San Francisco General Fund

3. Passenger fares

4. Advertising and miscellaneous services

Additionally, Transit Impact Development Fee (TIDF) funds, which were held in escrow pending a legal challenge, will be available in 1988/1989. TIDF funds may be used for capital and operating expenses related to downtown peak service increases beyond MUNI 1981 service levels.

TABLE 3.3-1. MUNI OPERATING COSTS, FY 1981-1982 TO FY 1985-1986 (MILLIONS OF DOLLARS)

	1981/1982	1982/1983	1983/1984	1984/1985	1985/1986
Salaries, wages, benefits	$115.3	$122.8	$129.6	$158.9	$163.4
Fuels, supplies	22.1	27.2	28.8	30.8	34.7
Utilities, misc.	11.9	13.9	10.9	13.3	17.2
TOTAL	$149.3	$164.0	$169.4	$203.1	$215.3

Source: San Francisco Municipal Railway, Short Range Transit Plan 1987-1992,

TABLE 3.3-2. MUNI OPERATING REVENUE SOURCES, FY 1981-1982 TO FY 1985-1986 (000's)

	1981/1982	1982/1983	1983/1984	1984/1985	1985/1986
Fare Revenue	$46,404	$51,078	$51,844	$55,501	$62,081
Non-Fare Operating	899	1,248	3,295	2,335	3,341
San Francisco General Fund	59,367	74,228	69,261	100,065	102,844
State/Regional Subvention	28,632	32,446	34,668	34,669	41,530
Federal Assistance	14,080	6,700	13,953	9,012	8,985
TOTAL	$149,383	$165,700	$173,024	$201,582	$218,781

Source: San Francisco Municipal Railway, Short Range Transit Plan 1987-1992, Federal Subventions. As stated previously, Section 9 is a Federal grant program that provides block grants for both capital and operating assistance. The funds are subject to Congressional action. Funds are appropriated by UMTA to urbanized areas according to population and service. MUNI's Federal operating subsidies ranged from a high of $14.08 million in 1981/1982 to a low of $8.02 million in 1987/1988, reflecting the current administration's policy to phase out transit operating subsidies.

State Subventions. State funding is from two sources: AB 1107 regional sales tax and Transportation Development Act (TDA) County sales tax. AB 1107 is generated by the 1/2 cent sales tax levied in BART counties. By State law, 75 percent of the revenue generated from sales taxes is allocated to BART, and 25 percent is shared between MUNI, BART and AC Transit. TDA Funding is generated by sales tax revenues collected within San Francisco.

State subventions have remained an almost constant share (around 19 percent) of MUNI revenues.

Regional Subventions. In FY 1986/1987, MUNI began receiving funds from BART as a means of recognizing that many passengers transfer from MUNI to BART, and would not choose to use BART without the access provided by MUNI. These patrons add to BART's overall ridership and thus increase its revenues. In the current year, BART provided $1.2 million to MUNI, and this contribution is expected to remain constant.

San Francisco General Fund. The ability of MUNI to fund new programs in any given year depends directly on the financial status of the City. The City's General Fund must pay for all operating expenses not financed by fares and subventions. The General Fund is the largest contributor to MUNI. The General Fund's share is increasing annually. In 1981/1982, it accounted for 40 percent or $59 million. In 1985/1986, its share had increased to 47 percent or $103 million.

Transit Impact Development Fee (TIDF). In addition to the revenues mentioned above, proceeds from the Transit Impact Development Fee (TIDF) will soon be available to the City, and could be used for operating improvements. Funds have been collected since 1981 to pay for a portion of the incremental costs of additional peak hour transit service required by new office development. The fee, set at $5 per square foot of new or converted office space, constructed in downtown San Francisco, is levied on commercial developers. At the present time, these revenues are invested in short term securities by the Treasurer of the City and County of San Francisco.

The legality of the fee was challenged in court by a group of developers, but its validity was upheld by the State Appellate Court in January, 1987. That decision was appealed to the State Supreme Court, and in April, 1987, the Court issued a decision not to hear the case. As a result, the decision by the State Appellate Court to uphold the legality of the fee remains in effect and the City may begin spending the funds. As of April, 1988, nearly $44.1 million had been collected, including accrued interest income.

Passenger Fare Revenue. Passenger fare revenue is the second largest contributor to MUNI's operating budget, ranging from $46.4 million to $62.1 million from 1981-1982 to 1985-1986, respectively. Passenger fares comprised approximately 31 percent of MUNI's operating budget revenues in 1985-1986.

PORT OF SAN FRANCISCO

The Ferry Building area, owned and leased by the Port of San Francisco, is located at the foot of Market Street. The facilities owned by the Port in this area, the Ferry Building, Agriculture Building, the parking spaces, and Piers 15 to 32, generate revenues for the Port. The Ferry Building and the Agriculture Building are presently occupied by offices (law firms, architects, engineering firms, travel agents), restaurants and the Golden Gate Ferry Terminal.

Parking is a major source of revenue to the Port. There are approximately 1,800 parking spaces, on-street metered and monthly/daily lots that are under the jurisdiction of the Port. In addition, restaurants in the area depend on the availability of valet parking to serve their patrons.

The Port is presently considering offers from developers for the following piers:

Pier 15/17:	a lease agreement has been approved by the Port Commission for a cotton warehouse that would generate 400 to 500 boxcar traffic per year.
Piers 24 and 26:	developers are proposing to build the San Francisco International Sailing Center which includes restaurants, shops, public access, and hosting boat shows and international sailing events.
Pier 30/32:	various developers are discussing options to use this site.

The projects are in the discussion stages and will require Environmental Analysis prior to Port Commission approval, lease agreements, and various permit approvals.

SAN FRANCISCO RECREATION AND PARKS DEPARTMENT

Justin Herman Plaza, administered and maintained by Recreation and Parks, has become one of the key drawing spots in San Francisco and especially in the downtown. The Plaza attracts lunchtime crowds (brown baggers and restaurant crowds). Its close proximity to the waterfront, the many retail shops, and restaurants and street artisans attract many tourists.

Events, which are revenue generating to the Recreation and Parks Department, are scheduled throughout the year. Events range from Earthquake Preparedness, radio station sponsored events, rock concerts, SPCA adoptions of cats and dogs, and street vendors selling their handcrafted wares (pictures, pottery and jewelry). The summer months, autumn, and the Christmas season are the most heavily scheduled months for events.

3.4 TRAFFIC AND TRANSPORTATION

3.4.1 PUBLIC TRANSPORTATION CIRCULATION

The project area is served by several transit properties operating a variety of modes. The transit agencies are the San Francisco Municipal Railway (MUNI), Bay Area Rapid Transit (BART), and Golden Gate Transit Ferries. Additionally, immediately west of the project boundaries lies a regional transportation center, the Transbay Terminal, which is served by MUNI, AC Transit (Alameda-Contra Costa), SamTrans (San Mateo County Transportation District), Golden Gate Transit (Marin and Sonoma Counties), bus service to the Amtrak rail station in Oakland, and Trailways buslines.

Within the project boundary, MUNI operates 23 diesel and trolley lines, including ten express routes, five MUNI Metro lines, and one cable car line (see Figure 3.4-1). MUNI utilizes a bus turnaround for ten lines immediately south of Justin Herman Plaza on Mission Street.

MUNI Metro shares the Market Street subway with BART trains. Both systems utilize the Embarcadero Station located under the foot of Market Street to bring riders from San Francisco, the East Bay, and the Peninsula to destinations within the project area.

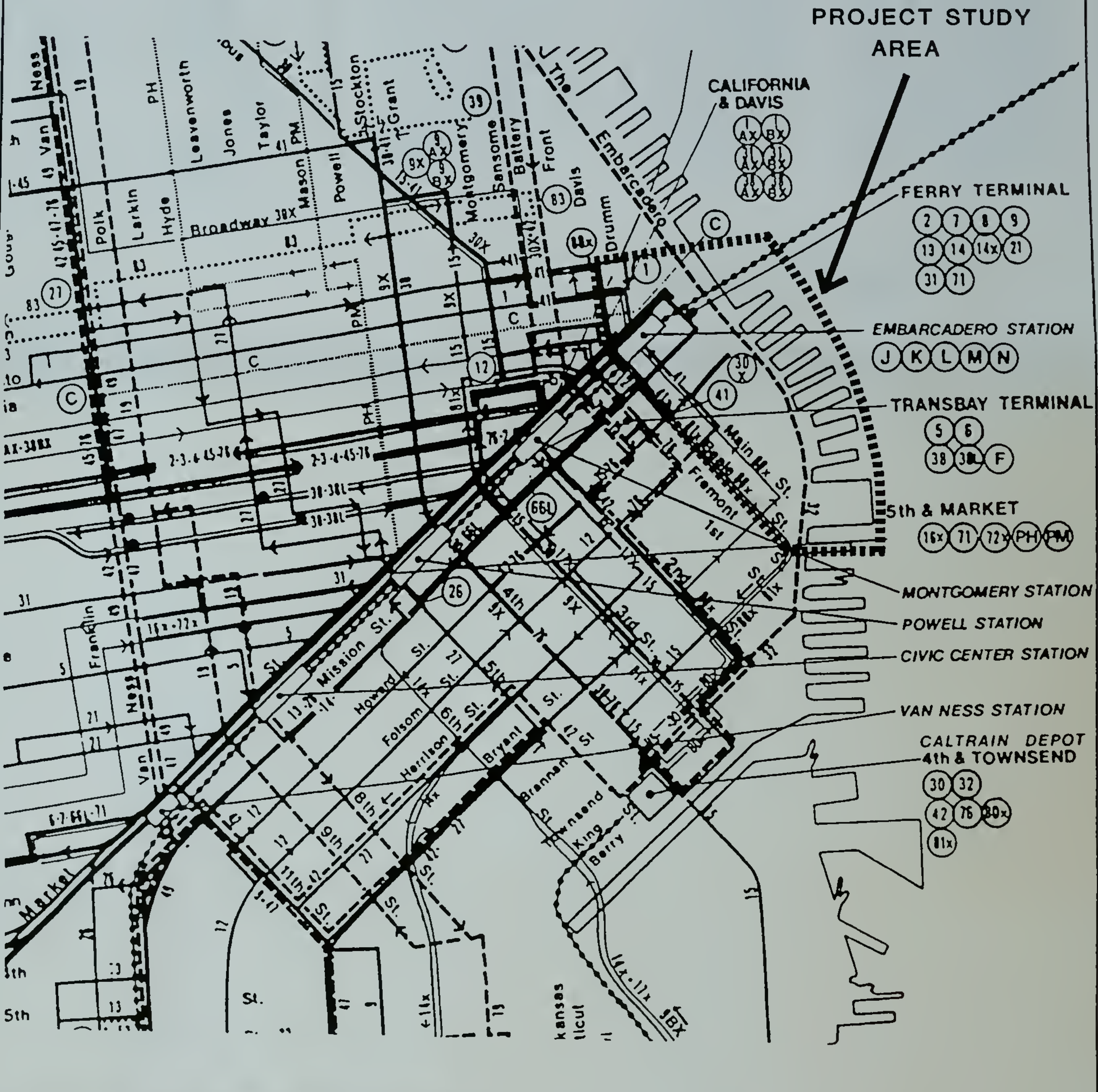
MUNI Metro trains converge from the southern and western portions of the City into the Market Steet subway at West Portal (lines K, L, and M) and Duboce Portal (lines J and N). All trains travel to and reverse direction at the Embarcadero Station. Trains operate daily, with weekday service commencing at 5:00 A.M. and finishing by 12:30 A.M. Late night (owl) buses provide substitute service between midnight and 5:00 A.M.

Of the 130 light rail vehicles, MUNI schedules 103 vehicles during the peak periods. The P.M. peak scheduling utilizes six minute headways on the J, L and N lines, and 12 minutes on the K and M. Except for single car J trains, all trains operate with two cars during the peak and can couple together at the portals as three and four car trains for their journey in the Market Street subway.

3.4.2 TRAFFIC VOLUMES/ROADWAYS CAPACITIES

The streets of primary interest within the project area are bounded by Clay Street on the north, Brannan Street on the south, Beale Street on the west and the Embarcadero on the east. Access to Interstate 80 is provided by an on-ramp to the Embarcadero Freeway at Beale Street near Mission. Traffic from the freeway system uses an off-ramp at Main Street.

Major north-south movements on The Embarcadero utilize two traffic lanes in each direction. The northbound lanes are easterly of the Embarcadero Freeway structure. The southbound lanes pass beneath the west column bays of the freeway structure in the vicinity of the Ferry Building. Steuart Street is two way, allowing MUNI trolley coach access to and from the bus turnaround. Spear Street has two lanes southbound, Main Street two lanes northbound, and Beale Street two lanes southbound.


PROJECT STUDY AREA
CALIFORNIA & DAVIS
1 AX, 1 BX
FERRY TERMINAL
2 7 8 9 13 14 14x 21 31 71
EMBARCADERO STATION
J K L M N
TRANSBAY TERMINAL
5 6 38 38L F
5th & MARKET
16x 71 72x PH PM
MONTGOMERY STATION
POWELL STATION
CIVIC CENTER STATION
VAN NESS STATION
CALTRAIN DEPOT 4th & TOWNSEND
30 32 42 76 80x 81x
The Embarcadero
Drumm
Davis
Front
Battery
Sansome
Montgomery
Grant
Stockton
Powell
Mason
Taylor
Jones
Leavenworth
Hyde
Larkin
Polk
Van Ness
Broadway
Franklin
Market
Mission St.
Howard St.
Folsom St.
Harrison
Bryant St.
Brannan
Townsend
King
Berry
Main St.
Beale St.
Fremont
1st
2nd
3rd St.
4th
5th
6th St.
8th
9th
11th
Kansas

SOURCE: SAN FRANCISCO MUNICIPAL RAILWAY

N
SCALE

FIGURE 3.4-1 MUNI LINES IN PROJECT AREA

Major east-west through movements are on Market, Mission, Howard and Folsom Streets. Market is a Transit Preferential Street and Pedestrian Oriented Street terminating at Steuart Street, offering two traffic lanes in each direction. Autos on Market Street flow in mixed traffic with MUNI vehicles. Mission Street, a transit preferential street, has two lanes in each direction and, unlike Market Street, intersects The Embarcadero. Mission Street is one of the most heavily utilized transit streets in the downtown. Both Howard and Folsom Streets, which also intersect The Embarcadero, have four lanes operating one way westbound and eastbound, respectively. Parking is allowed on all streets except Market Street and, during the peak hours, on Mission Street. During the peak hours the Mission Street parking lanes are used as high occupancy vehicle lanes for transit operation.

Existing and projected volume to capacity ratios and corresponding Level of Service for intersections in the project area along The Embarcadero are shown in Table 3.4-1. The volume to capacity ratio describes the proportion of a roadway's capacity that is being utilized by vehicular traffic during a given time period. The greater the ratio, the more congested the roadway. A ratio of 0.9 or 1.0 reflects serious delays and stop-and-go driving conditions. Forecast volumes may produce V/C ratios greater that 1.0, but actual volumes cannot exceed capacity except for short periods of time. To clarify the degree of vehicular traffic congestion, V/C ratios are often translated into Level of Service (LOS) as indicated in Table 3.4-2.

Table 3.4-1 indicates that, during the P.M. peak, traffic flow along The Embarcadero currently has few delays except for the intersection of Embarcadero/Mission where drivers may experience 25 to 40 second delays. By the year 2000, this intersection could be operating at stop-and-go conditions, producing delays of over 60 seconds and long turning queues. Further south at Embarcadero/Folsom, traffic is expected to become slightly more congested, but not sufficiently to produce excessive delays or queuing lasting for more than one signal change. Because the Embarcardero Parkway is not being designed to provide greater roadway capacity, projected Levels of Service, as indicated in Table 3.4-1, are not expected to be altered.

TABLE 3.4-1. TRAFFIC CIRCULATION ALONG THE EMBARCADERO (P.M. PEAK HOUR)

	CURRENT (1986)		YEAR 2000	
INTERSECTION	VOLUME TO CAPACITY RATIO (V/C)	LEVEL OF SERVICE (LOS)	VOLUME TO CAPACITY RATIO (V/C)	LEVEL OF SERVICE (LOS)
Embarcadero/Mission	0.88	D	1.05	F
Embarcadero/Howard	0.55	A	0.66	B
Embarcadero/Folsom	0.63	B	0.76	C
Embarcadero/Bryant	0.47	A	0.56	A

Source: DKS Associates, 1986.

TABLE 3.4-2. LEVELS OF SERVICE FOR URBAN AND SUBURBAN ARTERIAL STREETS

LEVEL OF SERVICE (LOS)	DESCRIPTION	AVERAGE VEHICLE DELAY (SECONDS)	VOLUME TO CAPACITY RATIO (V/C)
A	Free Flow. No approach phase is fully utilized by traffic and no vehicle waits longer than one red indication. Insignificant delays.	0-5	0.0-0.59
B	Stable Operation. An occasional approach phase is fully utilized. Many drivers begin to feel somewhat restricted within platoons of vehicles. Minimal delays.	5.1-15	0.60-0.69
C	Stable Operation. Major approach phase may become fully utilized. Most drivers feel somewhat restricted. Acceptable delays.	15.1-25	0.70-0.79
D	Approaching Unstable. Drivers may have to wait through more than one red signal indication. Queues develop but dissipate rapidly, without excessive delays.	25.1-40	0.80-0.89
E	Unstable Operation. Volumes at or near capacity. Vehicles may wait through several signal cycles. Long queues form upstream from intersection. Significant delays.	40-60	0.90-0.99
F	Forced Flow. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections. Excessive delays.	greater than 60	1.00 and above (a)

(a) Forecast volumes may produce V/C ratios greater than 1.00, although actual volumes cannot, by definition, exceed capacity except for short periods of time.

Sources: "Highway Capacity Manual," Transportation Research Board, Special Report No. 209, Washington, D.C., 1985.

"Interim Materials on Highway Capacity," Transportation Research Board, Circular No. 212, Washington, D.C., January 1980.

3.4.3. PARKING FACILITIES

Within the project study area are approximately 9,750 on-street and off-street (public) parking spaces. In the area of the Ferry Building, off-street parking is augmented by metered on-street spaces opposite the Ferry Building and additional on-street spaces to the south and north of the Ferry Building. Motorcycle parking is also provided.

3.4.4 TRANSPORTATION PLAN

NORTHEASTERN WATERFRONT TRANSPORTATION IMPROVEMENTS

Background. During the 1950s and 1960s, plans existed to extend I-280 from its current terminus at 4th Street to the Embarcadero Freeway (1.4 miles). The planned 1.4 mile connection to the Embarcadero Freeway was not built because of opposition to a waterfront freeway. In 1973 an amendment to the Federal Highway Act, Title 23, authorized withdrawal of any unconstructed segments of the Interstate System and substitution of these segments with other highway or transit projects. This amendment was the basis for the development of the I-280 Transfer Concept Program Study and EIR.

On February 19, 1980, the San Francisco Board of Supervisors adopted Resolution No. 152-80 to withdraw the originally proposed connection between I-280 and the Embarcadero Freeway from the Interstate Highway system. The withdrawal of the Interstate segment received concurrence of the Metropolitan Transportation Commission and the Governor. On January 16, 1981 the withdrawal request was approved by the U.S. Department of Transportation. Potential street and transit projects satisfying the same transportation needs were identified.

On September 28, 1984, a Draft Environmental Impact Report (EIR) was published which presented studies of traffic, costs and environmental impacts for eight alternative combinations of potential projects. The City Planning Commission certified the Final EIR on May 23, 1985 (Resolution No. 10320), satisfying State environmental requirements. Preparation of project specific environmental documents, meeting Federal requirements, is currently underway. Specific elements of the I-280 Transfer Concept Program, exclusive of the Turnaround Project and improvements to the Transbay Terminal, are described below.

Embarcadero-King Roadway Reconstruction Plan. In March, 1987, the Board of Supervisors approved Resolution 161-87 which authorized the Director of Public Works to apply for, accept, and expend Federal Aid Interstate funds for preliminary engineering for roadway reconstruction along The Embarcadero and King Street.

The Embarcadero Parkway is a key element of a series of transportation projects designed to provide a variety of transit and highway improvements in the Embarcadero Corridor, and is the result of continuing study by various City departments of the seven projects which evolved from the I-280 Transfer Concept. The Parkway project involves:

- Reconstruction and beautification of the roadway along The Embarcadero between North Point and Second Streets. The new Parkway would contain four lanes of traffic with left turn lanes at various street intersections. The Municipal Railway would operate in a street right-of-way.

- Construction of a boulevard along the present alignment of King Street to connect The Embarcadero to the I-280 terminus near Sixth Street. The new boulevard would provide six lanes of traffic and MUNI Metro operation in the median.

The portion of the Parkway project between the Ferry Building and Bryant Street is currently in preliminary design and affect the MUNI Metro Turnaround Project. This section is shown on Figure 3.4-2. Proposed modifications to the existing Embarcadero Roadway in this section are described below*:

MARKET TO HOWARD. The northbound lanes would remain while the southbound lanes are shifted under the freeway structure. The Belt Railway would be relocated into a traffic lane.

HOWARD TO FOLSOM. The traffic lanes swing away from the waterfront to Steuart Street, thus vacating land for a new waterfront park. The Belt Railway main track would be relocated to a traffic lane, and the side tracks abandoned. A median is provided for the MUNI Metro Turnaround.

FOLSOM TO HARRISON. The traffic lanes remain in Steuart Street and would return to a waterfront alignment at Harrison Street. The Belt Railway and median would be unaffected. Median space is provided for a future Metro passenger station.

HARRISON TO BRYANT. The traffic lanes would remain in a waterfront alignment with a median provided for MUNI Metro.

The San Francisco Department of Public Works has included curbside parking along redesigned King Street and is studying the possibility of setting aside areas of the Embarcadero Parkway for parking. An Environmental Assessment analyzing the effects of the Parkway project on parking, business relocation, air quality, historical resources, and excavation of hazardous materials will be published in November, 1989. Engineering and design work are scheduled to be completed in 1991. Construction will commence shortly thereafter.

Interstate 280 Access Improvements. As part of the Mission Bay plan, CALTRANS would remove the I-280 elevated freeway from Third to Sixth Street and remove the existing Fourth Street off-ramp. New ramps would be constructed at Sixth Street and integrated into the King Street roadway redesign so that access to and from I-280 would be enhanced, facilitating traffic circulation between the Embarcadero, Mission Bay, and the I-280 freeway.

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* The Parkway Project is in early stages of preliminary engineering and final design elements may ultimately vary from what is described in this discussion.

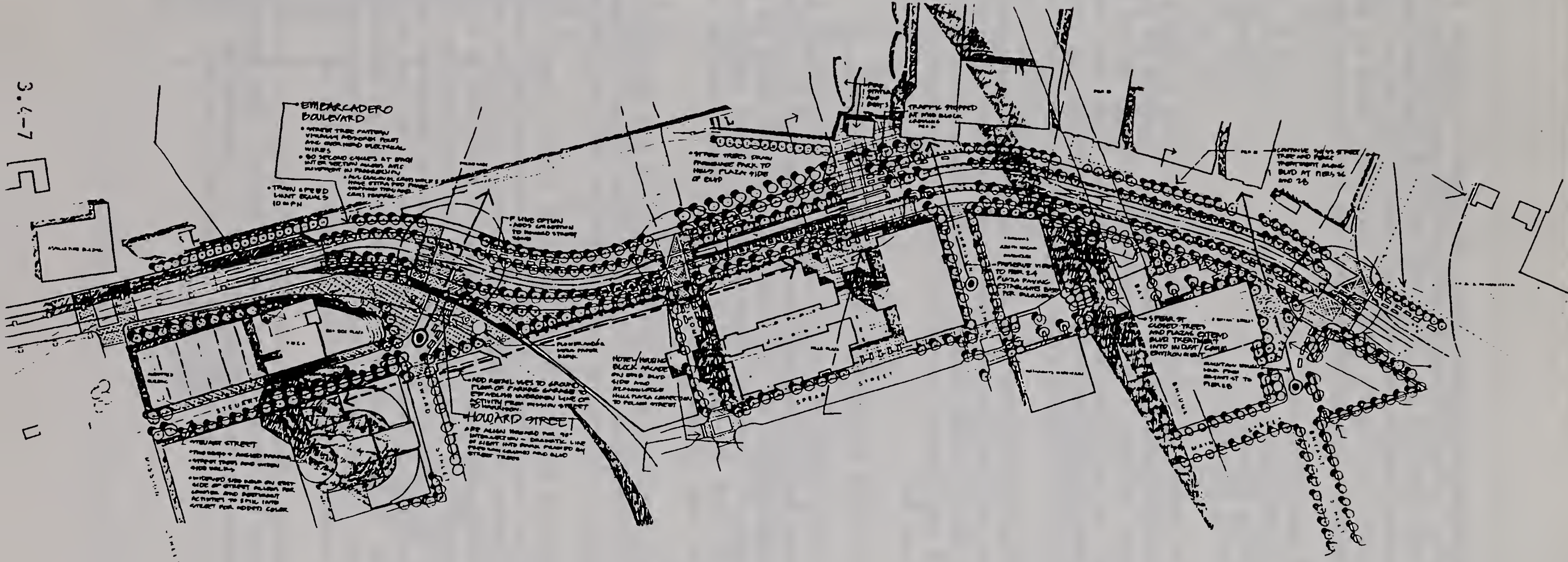

EMBARCADERO BOULEVARD
TRAIN SPEED LIMIT EQUALS 10 MPH
HOWARD STREET
STEUART STREET
SPEAR STREET
MAIN STREET
BAY

FIGURE 3.4-2
EMBARCADERO PARKWAY PROJECT DESIGN

MUNI Metro Extension to Mission Bay. As stated in Section 1.3.4, the MUNI Metro Extension, a locally funded project, is scheduled to provide service starting in 1993 from the proposed MUNI Metro Turnaround Project south and west to a terminus within the proposed Mission Bay project area near Fifth and Townsend Streets (see Figure 3.4-3). Four stops would be incorporated into the line extension. The probable locations for the stops are listed below:

- Hills Plaza/Rincon Hill
- Brannan/Embarcadero
- Second/King Streets
- Fourth/King Streets

The MUNI Metro Extension into Mission Bay is called for in a number of planning and policy documents. They include: the SCR 74 Study; the I-280 Transfer Concept Program; the Transportation Element of the Master Plan of the City and County of San Francisco; the Downtown Plan; the Draft Mission Bay Master Plan; and finally the Memorandum of Understanding between Santa Fe Pacific Realty Corporation and the City and County of San Francisco.

The Extension would eliminate the need for the 32-Embarcadero and 80X-Gateway Express routes, and would offer other opportunities for more efficient deployment of MUNI's local transit services in conjunction with land use development in the Central Waterfront Area, as described in the Draft Master Plan for Mission Bay.

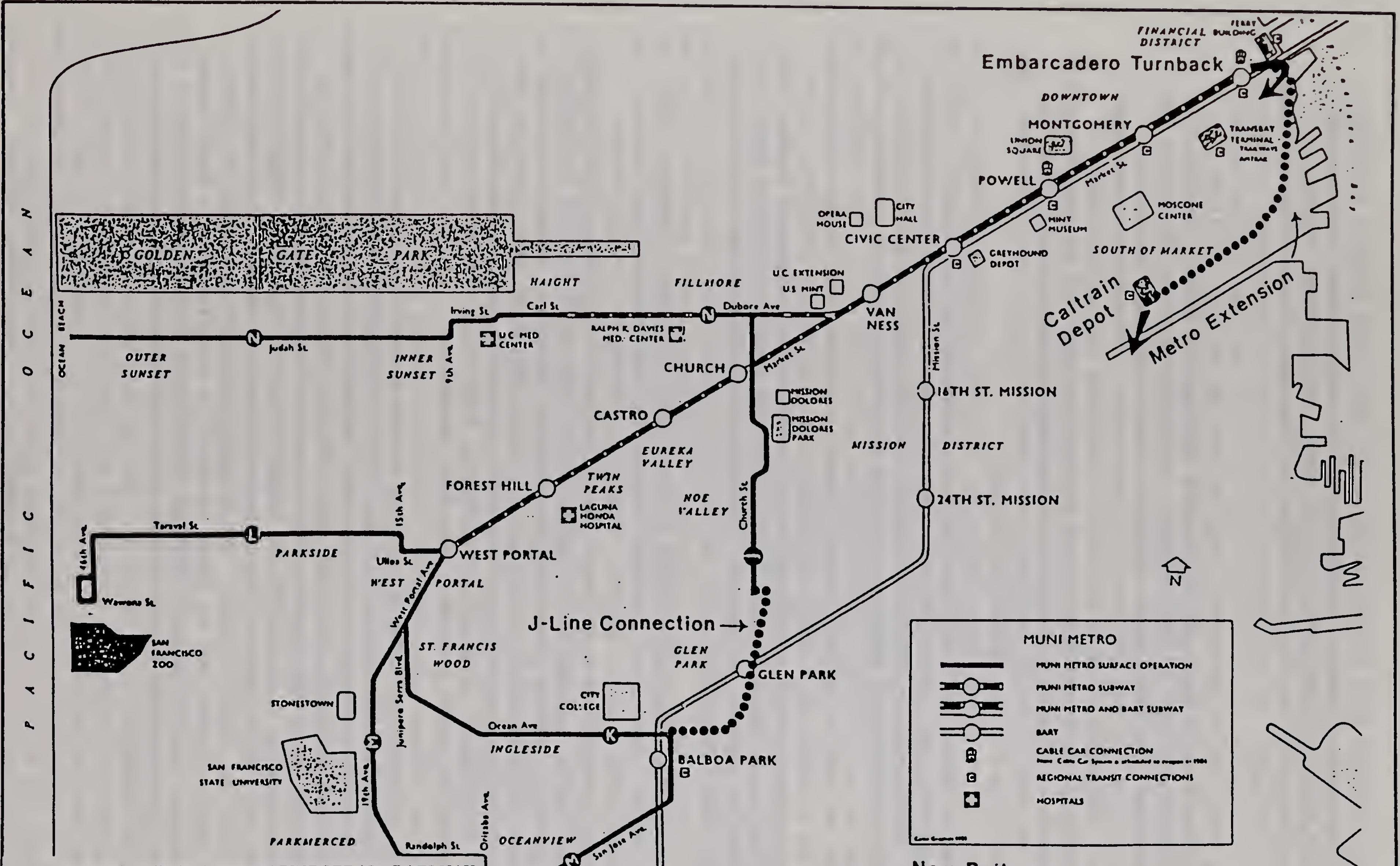
The proposed project includes the following elements:

- An at grade, double track exclusive transitway from the MUNI Metro Turnaround Project surface track to Sixth and King within the Mission Bay project area. The trackway would follow along an alignment in the median of a rebuilt Embarcadero Boulevard and continue within the median of King Street rebuilt as a boulevard leading to and from new I-280 on- and off-ramps.

- Four additional at grade stations within the Embarcadero Parkway and King Boulevard median, including a high capacity intermodal station adjacent to a Peninsula Commute Service station in Mission Bay.

The Metro Extension would provide improved, direct local transit service between the City's neighborhoods and downtown area and three areas of substantial proposed new development: Rincon Hill, South Beach, and Mission Bay. One transfer regional transit service with BART as well as a direct MUNI rail connection to the Peninsula Commute Service would be established. Finally, with the F-Market streetcar connection operating north of the Embarcadero Station, the Metro Extension would link the entire Northeastern Waterfront area with the Mission Bay development and the Peninsula Commute Service as well. It is envisioned that the Metro Extension would ultimately be continued south into the Mission Bay project area and beyond.

The I-280 Transfer Concept Program Study forecasts in excess of 20,000 daily transit trips by the year 2000 on the Extension. The opportunity exists to plan the Extension to assure that it will be incorporated into the City's land use planning in a highly compatible and mutually supportive manner.


Embarcadero Turnback
FINANCIAL DISTRICT
FERRY BUILDING
DOWNTOWN
MONTGOMERY
UNION SQUARE
POWELL
Market St
TRANSBAY TERMINAL
MOSCONE CENTER
MINT MUSEUM
CIVIC CENTER
OPERA HOUSE
CITY HALL
GREYHOUND DEPOT
SOUTH OF MARKET
Caltrain Depot
Metro Extension
U.C. EXTENSION
U.S. MINT
VAN NESS
FILLMORE
HAIGHT
GOLDEN GATE PARK
Carl St
Irving St
Duboce Ave
RALPH K. DAVIES MED. CENTER
U.C. MED CENTER
N
Judah St
OCEAN BEACH
OUTER SUNSET
INNER SUNSET
9th Ave
CHURCH
Market St
MISSION DOLORES
MISSION DOLORES PARK
Mission St
16TH ST. MISSION
MISSION
DISTRICT
24TH ST. MISSION
CASTRO
EUREKA VALLEY
TWIN PEAKS
NOE VALLEY
FOREST HILL
LAGUNA HONDA HOSPITAL
Church St
J
WEST PORTAL
15th Ave
Taraval St
L
PARKSIDE
46th Ave
Wawona St
SAN FRANCISCO ZOO
Ulloa St
WEST PORTAL
West Portal Ave
J-Line Connection →
ST. FRANCIS WOOD
GLEN PARK
GLEN PARK
CITY COLLEGE
Ocean Ave
K
INGLESIDE
BALBOA PARK
STONESTOWN
SAN FRANCISCO STATE UNIVERSITY
Junipero Serra Blvd
M
19th Ave
PARKMERCED
Randolph St
Orizaba Ave
OCEANVIEW
San Jose Ave
Broad St
P A C I F I C   O C E A N
N
MUNI METRO
MUNI METRO SURFACE OPERATION
MUNI METRO SUBWAY
MUNI METRO AND BART SUBWAY
BART
CABLE CAR CONNECTION
REGIONAL TRANSIT CONNECTIONS
HOSPITALS
New Rail ●●●●●

SOURCE: SAN FRANCISCO MUNICIPAL RAILWAY

N
SCALE

FIGURE 3.4-3 MUNI METRO EXTENSION

The Downtown Plan EIR also examined intra- and inter-City transit ridership demands for the next 15 years. Ridership growth was forecast to increase by approximately 40 percent between 1985 and 2000. The Downtown Plan EIR presumed that much of the forecast office development will occur in the South of Market.

Engineering work for the Extension would be done by the PUC Utilities Engineering Bureau as a part of the overall Embarcadero Parkway Project managed by the Department of Public Works. The BART Board of Directors has already authorized $15 million to construct the Extension. Subsequent resolutions by the PUC and the Board of Supervisors (#142-87) accepted these BART monies. Alignment studies are being undertaken by the Department of Public Works as part of the Embarcadero Parkway Project. No Federal funds are expected for the Extension. Since the Turnaround Project has utility independent of the Extension proposed, its construction is not affected by the planning schedules for the Extension project.

F-line. Market Street has traditionally had intensive public transit services, historically focused on streetcar operations. Rail cars ran on Market for 122 years prior to their removal in 1980, making it the longest continuously operated rail service on a main street anywhere in America.

The decision was made to eliminate most transit services from Market Street in 1968 based on a design plan which envisioned the underground MUNI Metro as an upgraded replacement service. Therefore, the removal of streetcar tracks and boarding islands, along with shifting most surface transit (trolleys and buses) to Mission Street, was assumed by architects and engineers who laid out the original redesign plans.

Increasing ridership demand generated by downtown development together with other circulation constraints rendered impractical any proposal to route surface transit onto Mission Street. Community pressure to retain Market Street transit resulted in a series of local legislative reversals to the 1968 plan, culminating in a decision to provide for a four lane transit operation on Market Street including streetcars (Resolution 160-83). Renewed interest was stirred to retain streetcar service on Market Street in the summer of 1983 when an "Historic Trolley Festival" was held, operating antique streetcars between the Upper Market area and the Transbay Terminal. Community support for the project has grown over the last four years.

The benefits to be derived from a historic streetcar service along Market Street were significantly enhanced by the Board's concurrent 1983 policy resolution to integrate it with the proposed extension of streetcar service to the Northeastern Waterfront and Fisherman's Wharf. From this resolution, a continuous Market Street/Northeastern Waterfront streetcar service, called the F-line, would result. Further PUC and Board action (Resolution 1058-86) in 1986 approved the rail alignment to be extended west on Market Street between Van Ness Avenue and Castro Street. The F-line was proposed to have an outer terminal at Castro Street and an inner terminal in the Fisherman's Wharf area. The F-line would, therefore, serve Market Street from Castro to the Ferry Building and The Embarcadero north of Market and provide the following public transportation benefits:

- Improved surface transportation along Market Street and along the Northeastern Waterfront using rail equipment in lieu of the existing trolley and diesel coach service. The 8-Market and 32-Embarcadero lines would be eliminated in favor of the F-Market line's higher capacity and higher quality service.

- Some relief to the overcrowded cable car lines, as significant numbers of people are expected to divert from cable cars to enjoy the historic flavor of the F-Market streetcar line for trips between the Downtown and Fisherman's Wharf.

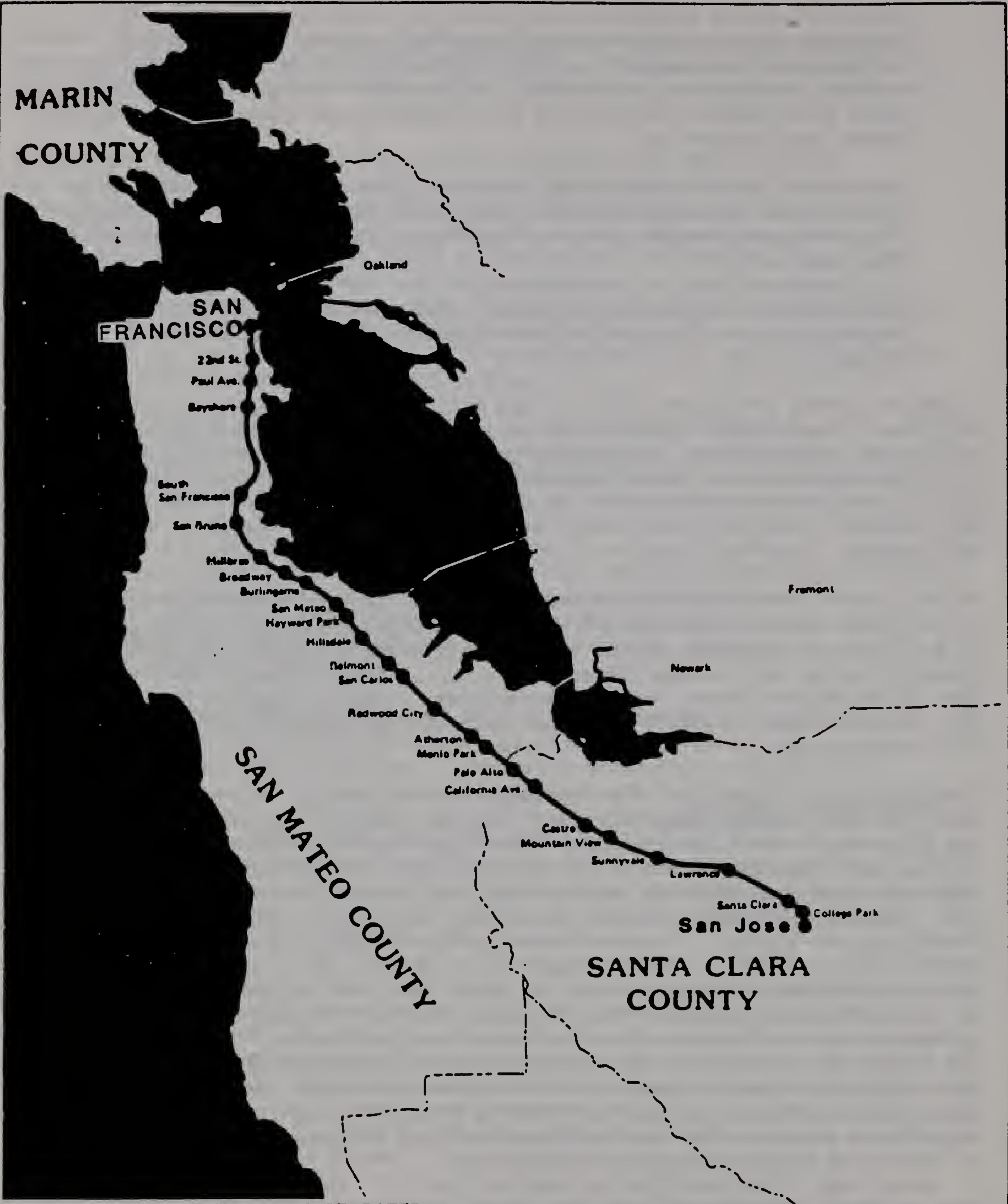
- Maintenance of surface Market Street rail service, which could be useful whenever scheduled or unscheduled maintenance of the Metro subway system occurs.

An Environmental Assessment (EA) for the F-line along Market Street was published in late 1988. UMTA issued a finding of No Significant Impact for the Market Street portion of the project on September 30, 1988. Discussion continues regarding the final alignment for the extension along The Embarcadero to Fisherman's Wharf. A separate EA will evaluate route alignment and terminal location to the F-line extension from Market Street at the Embarcadero.

Travel demand forecasts prepared for the I-280 Program EIR estimated that some 23,000 daily riders would use the F-line streetcar initially, with a capacity to absorb nearly twice as much. This compares with 20,000 daily riders presently using the 59-Powell-Mason Cable Car. Construction of the F-line, as part of the Market Street Transit Thoroughfare Project, began in May, 1988. The overall project schedule calls for operation on Market Street to be initiated in 1992.

Peninsula Commute Service. The Peninsula Commute Service (PCS) serves the 47 mile West Bay transportation corridor from San Jose through Santa Clara and San Mateo Counties to San Francisco (see Figure 3.4-4). Currently, the PCS carries approximately 16,000 daily riders, primarily commuters, to the San Francisco terminus (Southern Pacific Depot) at Fourth and Townsend. Until 1980, this service was owned and operated by the Southern Pacific Transportation Company. Because of declining ridership and lack of profitability, Southern Pacific requested to abandon the commute service. The State of California intervened and, in July, 1980, the California Department of Transportation (CALTRANS) entered into a ten-year "Purchase of Service" agreement with the Southern Pacific Transportation Company. The objective of the agreement was for CALTRANS to take over the responsibility for, improve, and enhance the commuter rail service in order to attract additional riders. Under this agreement, the Southern Pacific Transportation Company continued to operate the service while the administrative and funding roles were performed by County and State governmental agencies.

More recently, the State of California has indicated that it would withdraw its operating support for the Peninsula Commute Service when the agreement with Southern Pacific terminates in 1990. A Joint Powers Board (JPB), consisting of representatives from San Francisco, San Mateo, and Santa Clara Counties, has been charged with the responsibility to determine the operation and financing for PCS service after the State withdraws. A number of issues related to upgrading service are being examined as part of the JPB planning process. One of the primary issues involves terminal relocation in San Francisco. The existing station occupies land owned by the Santa Fe Pacific


MARIN COUNTY
Oakland
SAN FRANCISCO
22nd St.
Paul Ave.
Bayshore
South San Francisco
San Bruno
Millbrae
Broadway
Burlingame
San Mateo
Hayward Park
Hillsdale
Belmont
San Carlos
Redwood City
Atherton
Menlo Park
Palo Alto
California Ave.
Castro
Mountain View
Sunnyvale
Lawrence
Santa Clara
College Park
San Jose
Fremont
Newark
SAN MATEO COUNTY
SANTA CLARA COUNTY

SOURCE: EARTH METRICS INCORPORATED

N

SCALE

FIGURE 3.4-4 PENINSULA COMMUTE SERVICE (SAN FRANCISCO TO SAN JOSE)

Corporation. Santa Fe Pacific intends to develop the station area as part of a comprehensive Mission Bay project, which covers approximately 300 acres. To this end, Santa Fe Pacific, in concert with the City of San Francisco, has requested that the station be relocated to an interim location, perhaps at Seventh and Channel, until resolution of the proposal to relocate the Peninsula Commute Service terminal in downtown San Francisco occurs. The JPB in cooperation with UMTA will prepare a station relocation Draft EIS to be published within the next 18 months. One of the alternatives to be considered in this DEIS is the extension of MUNI Metro to a relocated 7th and Channel location.

3.4.5 PEDESTRIAN TRAFFIC

Pedestrian activity within the project area centers on the Ferry Building. Volumes are greatest between the Ferry terminal, the Golden Gateway and the Bayfront Promenade to the south. Heaviest pedestrian volumes are at the crosswalk and area between the Ferry Building and Justin Herman Plaza, 6,000 to 8,000 people per peak period (7:00 to 9:00 A.M. and 4:00 to 6:00 P.M.). Significant pedestrian volumes cross The Embarcadero to reach the Promenade at Mission Street. Lesser volumes cross at the intersections of Folsom, Harrison and Bryant.

3.4.6 PORT OF SAN FRANCISCO OPERATIONS/PLANS

Between South Beach/China Basin and the Ferry Building, Port of San Francisco pier facilities are in various conditions. The Ferry Building redevelopment proposal is currently in litigation. The Ferry Building is primarily utilized for offices with some ground floor retail. The Agriculture Building, a part of the proposed Ferry Building redevelopment, is also utilized for offices. Piers 14, 18, 20 and 22 were condemned and demolished as part of the Bayfront Promenade project. Pier 22-1/2, the recently rehabilitated San Francisco Fireboat Station, is an active Fire Department facility. Pier 24 is currently utilized for warehouse and storage operations. Piers 26 and 28 are currently utilized for ship repair services. Piers 24 and 26 are the sites of a currently proposed International Yachting Center. Pier 30/32 is currently vacant. The Belt Line Railway is operational but is currently not in use within the project study area.

3.4.7 GOODS MOVEMENT

For goods movement by truck, the Port of San Francisco has developed a guide that identifies access routes from freeways and the Bay Bridge. These routes feed into The Embarcadero which is the primary north-south facility serving the waterfront in the Project Study Area. The access routes include Harrison, Folsom, and Bryant Streets.

Truck goods movement along The Embarcadero is related to the Port's maritime activity and other commercial activity. Generators of truck movements include Fisherman's Wharf, commercial businesses such as Cost Plus, as well as Port activities that extend all along the waterfront. The principal scheduled Port related use of the Embarcadero Roadway involves the daily transshipment of newspaper from Pier 27/29 to various San Francisco news agencies. Servicing the Passenger and Foreign Trade Terminals at Pier 33/35 and 19, respectively, also generates freight shipments, although less regular, along The Embarcadero (Rossi, Port of San Francisco, 1988).

Additionally, the commercial buildings along Steuart Street between Mission and Howard require access from Steuart and The Embarcadero for nonscheduled goods movements and garbage pick-up. These goods include food, office supplies, hotel supplies and miscellaneous supplies for the YMCA.

3.5 URBAN DESIGN

3.5.1 URBAN DESIGN CONSIDERATIONS

INTRODUCTION

The urban design setting discussion focuses on the waterfront of the Turnaround study area. The urban design evaluation of the MUNI Turnaround facility within the existing and rapidly changing environment along the waterfront is a primary purpose of this chapter. The goals of the urban design evaluation are to enhance the visual character and the waterfront physical access in the Turnaround Project area. The urban design discussion of the Turnaround area is organized into three elements: parks and open spaces, historical/architectural features, and the land use changes in the project study area.

OVERVIEW

San Francisco has a unique city image in that it is defined by water on three sides and can be viewed almost entirely from nearby land masses and bridges. The degree to which the water's edge is recognized and enhanced is an important urban design consideration of waterfront development.

San Francisco's waterfront has changed dramatically since its origin as the village of Yerba Buena. The irregular shoreline followed the bases of what are today Telegraph, Rincon and Potrero Hills. The original harbor, Yerba Buena Cove, extended from Clark's Point at the foot of Broadway to Rincon Point at the foot of Harrison, is now completely filled in. The entire Turnaround Project Area except for small portions of some blocks on Rincon Point along Harrison, are on Yerba Buena Cove bayfill. Through the gradual filling of natural low water areas, the shoreline was extended and made more regular. The New Seawall, built in sections beginning in 1887, created The Embarcadero and transformed the waterfront into a uniform edge. Extending from Pier 47 in the north to Pier 46 in the south, it established commercial and recreational opportunities for using the Bay on a completely new scale. After the New Seawall was established, finger piers were built over a period of time to increase the efficiency and volume of maritime uses. Bulkheads were added along The Embarcadero later to screen what was considered to be the unsightliness of pier facilities. Other important design elements along the waterfront include the Bay Bridge, the Embarcadero Freeway, the historic ships, the Ferry Building, and Ferry Plaza. The photographs in Figures 3.5-1 through 3.5-6 show selected views of existing conditions along the waterfront within the project area.

PARKS AND OPEN SPACES

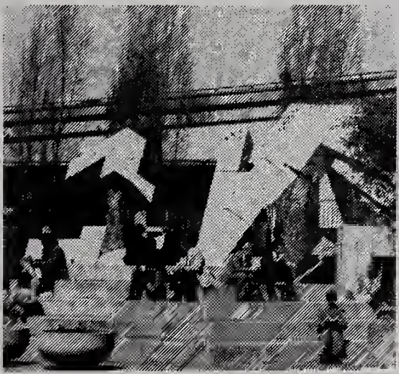
The two major park/open space features in the Turnaround study area are Justin Herman Plaza and the Bayfront Promenade. A park inland of the Promenade is to be developed as an element of the Rincon Point Redevelopment Project. It would be constructed after the Embarcadero Roadway is realigned in this area. Justin Herman Plaza, completed in 1971 as part of the Embarcadero Center Redevelopment Project, is the largest public open space in the high-rise office district of downtown San Francisco. Justin Herman Plaza complements the smaller scale open spaces of the three-level retail complex at

Justin Herman Plaza One of the very few green areas, it was designed principally as a visual and physical access buffer to the Embarcadero roadway. The lack of convenient access points to the lawn area may contribute to low usage.

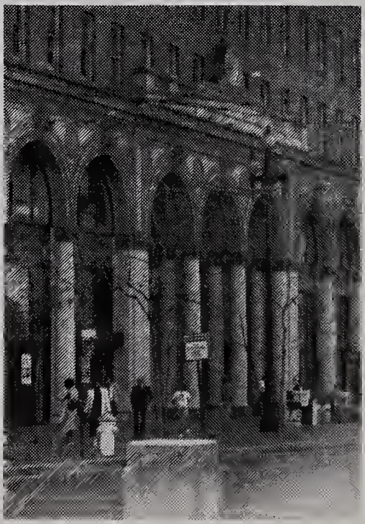
JUSTIN
HERMAN
PLAZA

Justin Herman Plaza The network of pedestrian spaces and plazas provide relief, sunshine, space for exercise and a moment of quiet in a high-density urban environment. The urban design quality of this open space varies from the active crowd-oriented spaces of the plaza area to the quiet and softness of the somewhat under-utilized park area.

Justin Herman Plaza provides lunch-hour open space and recreation for downtown office workers.

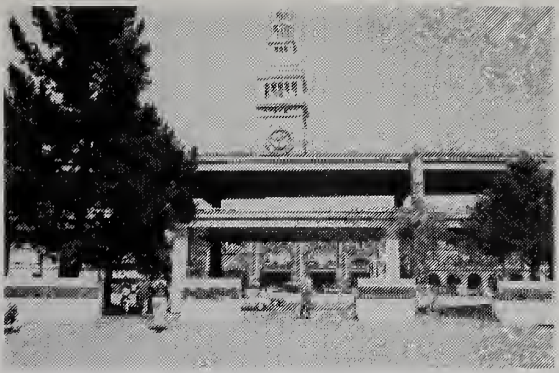


Vaillancourt Fountain (Justin Herman Plaza) This centerpiece of Justin Herman Plaza seeks to provide a visual focus for the plaza. Its non-traditional design was very controversial when installed in 1971.

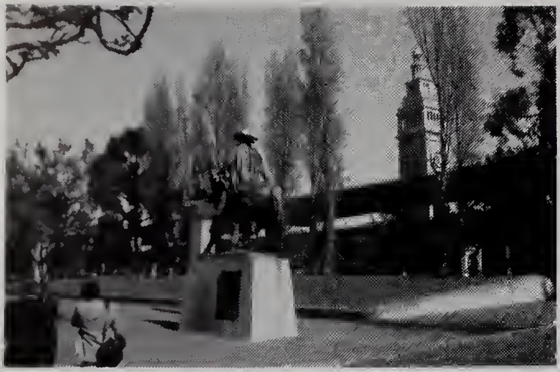


Southern Pacific Building This historic building is the centerpiece of the One Market Plaza development. Southern Pacific is an architectural triumph of the Beaux-Arts tradition. The Renaissance and Baroque ornamentation of the Southern Pacific Building is a superb urban design feature visible from Market Street, Justin Herman Plaza, the Ferry Building, and The Embarcadero.

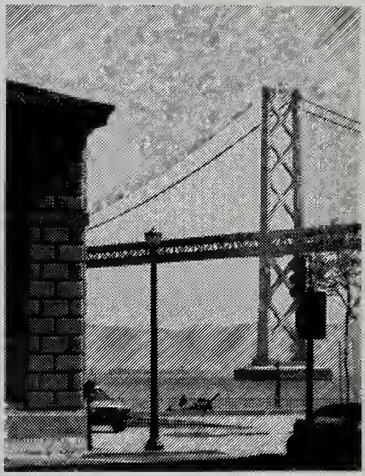
FIGURE 3.5-1



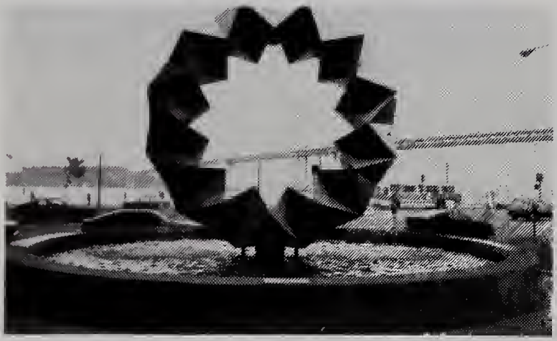
Ferry Building/Justin Herman/Market Street Interface The Ferry Building is spatially isolated from downtown by the Embarcadero Freeway. Normally, pedestrians must wait through two light signal changes to cross the entire Embarcadero roadway and parking areas in the middle.



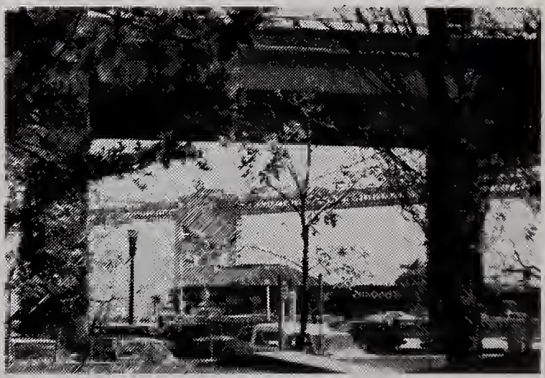
Justin Herman Plaza South of Market This grassy park area is picturesque but under utilized. Mounding of planting area is a buffer for physical access and views of the surface roadway and the elevated freeway.



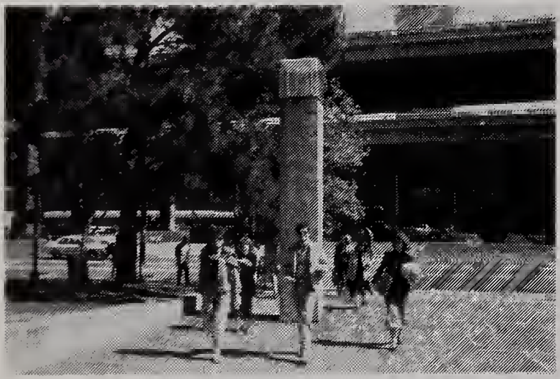
Agriculture Building Beyond the Embarcadero Freeway, the visual access and character of the waterfront improves dramatically.



Bayside Plaza Urban amenities, such as this fountain and open space at Bayside Plaza, Howard and the Embarcadero, enliven and enrich a difficult space, especially in the noontime sun. The active water sculpture, Aurora by Ruth Asawa, connects visually to the passive Bay waters, frames views of the Bay, and muffles the overhead freeway traffic noise. People do use this space against all odds.



Views Framed Many of the views along the waterfront are framed by the horizontal and vertical elements of the Embarcadero freeway structure. Many other views, however, are blocked by the freeway structure.



Market Street-Ferry Building Access Pedestrian access to the waterfront in the project area is undefined and difficult at key locations.

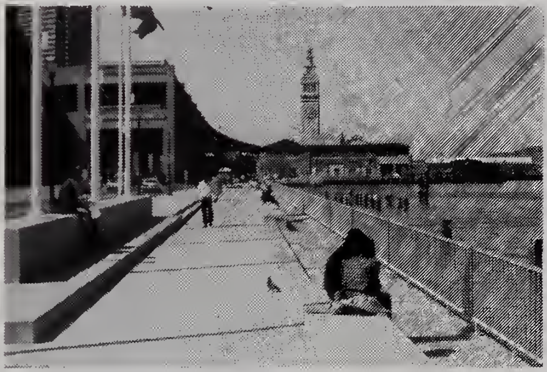
FIGURE 3.5-2

The Waterfront Promenade The most successful attempt in San Francisco to establish visual and physical access to the bayside waterfront.

Visual Access Achieved The distinctive Embarcadero street lamps and the profile of the Bay Bridge define this scene as the San Francisco Embarcadero.

The Promenade Inspiring vistas, solitude, open space and sunshine are the main attractions of the water's edge away from the congestion, shadows and winds of downtown development.

The Waterfront Promenade Simple design elements defer to the Bay views and create visual and physical access to the waterfront.



The Promenade From the Promenade, however, visual and physical access to downtown is blocked by the Embarcadero Freeway structure.

Ferry Building from the Promenade A classic urban waterfront setting featuring a long romantic vista with the sunlit clock tower of the Ferry Building is a visual asset established by the new waterfront Promenade. Water on one side and the city on the other make this vista a visual treasure. The freeway structure as a visual and physical obstruction separating the Ferry Building from the city is also well illustrated in this view from the Embarcadero Promenade.

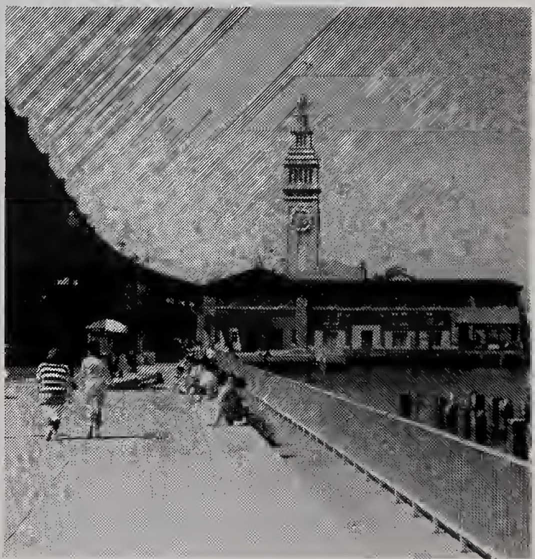
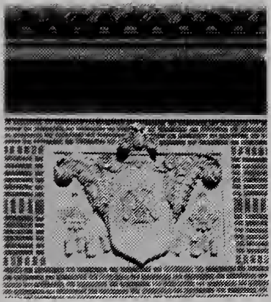
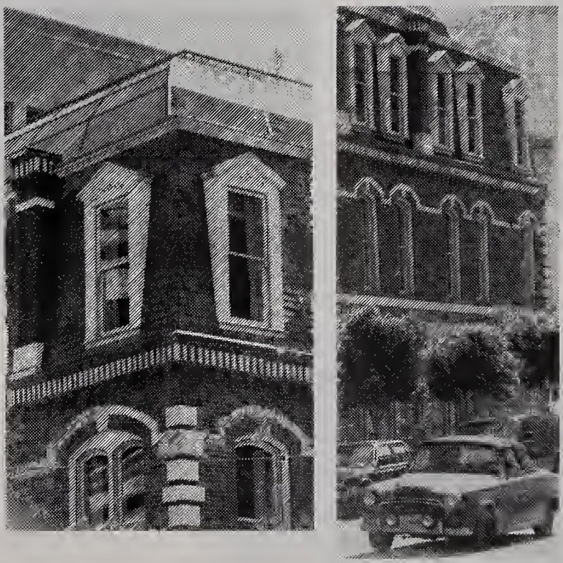


FIGURE 3.5-3

San Francisco Ferry Building, Southern Pacific Building, Audiffred Building, Agriculture Building
The strong visual character of these Embarcadero landmark buildings helps to establish the character and historical significance of the area.





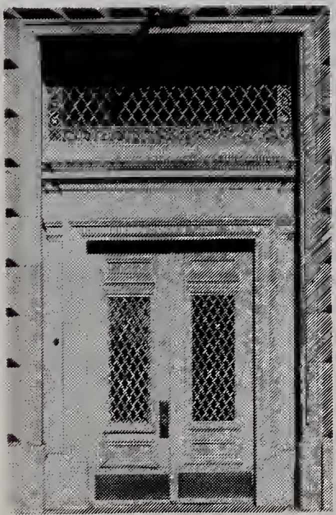
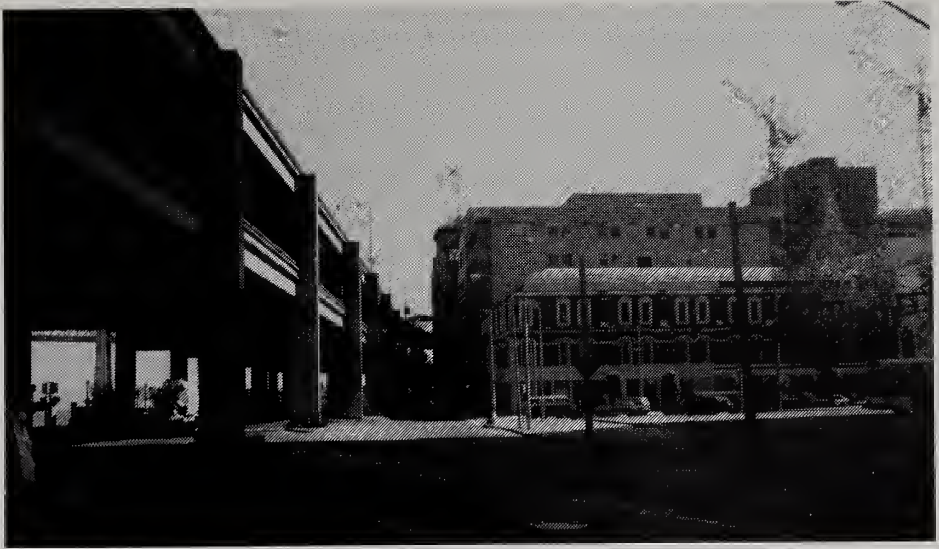
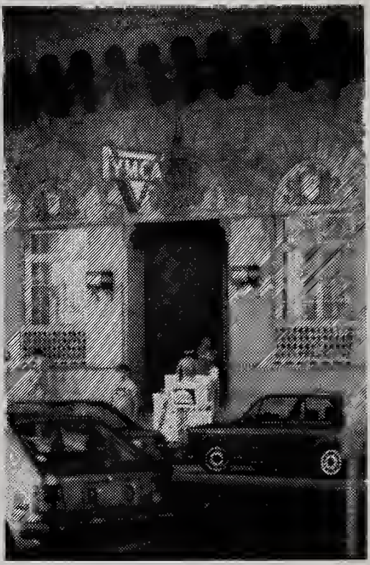


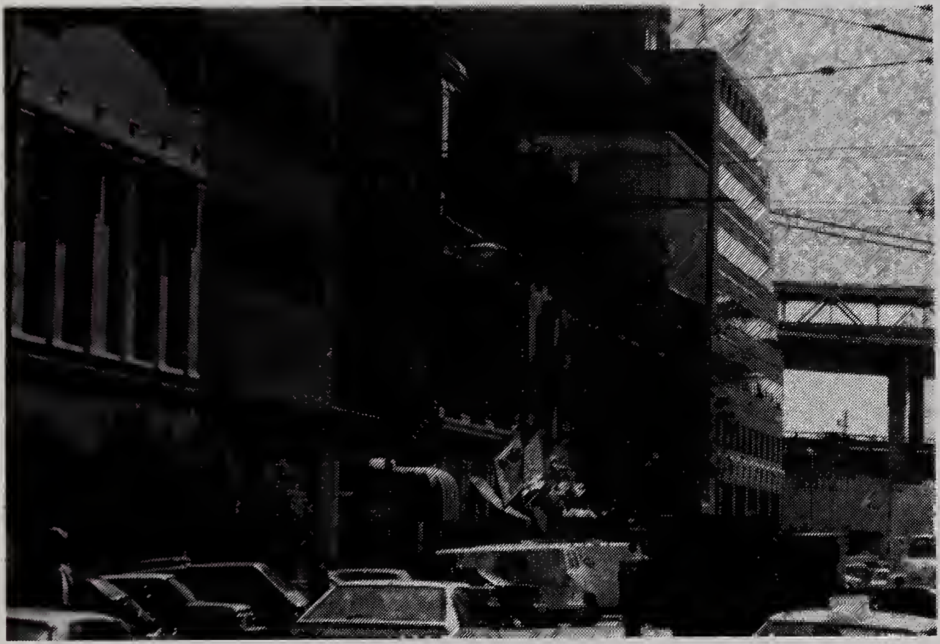
FIGURE 3.5-4



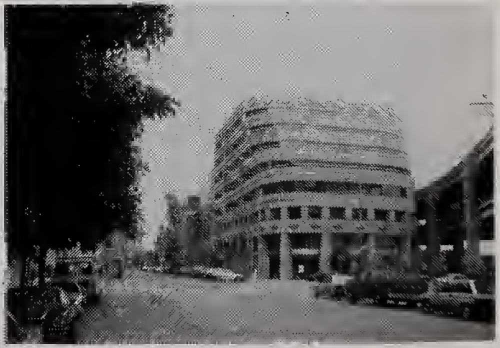
Encroachment of the Freeway viewed looking south from southbound lanes of the Embarcadero roadway. The abruptness of the city's edge at the freeway in its relationship to historic East Street Row.



The YMCA Building viewed from under the Embarcadero Freeway. The historic YMCA its special quality is often shadowed by the freeway.



East Street Row viewed looking south from Steuart Street. A unique blend of recent and historic buildings of a uniform scale at the water's edge, fosters a neighborhood feeling that provides character to the area. East Street Row offers a historic context to visualize San Francisco's nineteenth-century architectural history and downtown waterfront character.



Bayside Plaza Building A successful attempt to anchor and shelter the East Street Row historical buildings.

FIGURE 3.5-5

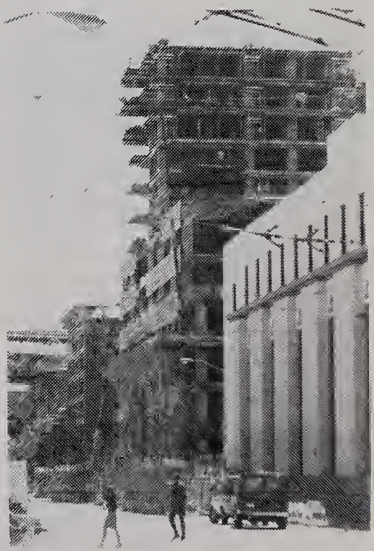
The Hills Brothers Coffee Building The Hills Brothers Coffee Building, a major waterfront visual landmark, will be preserved and redeveloped. A planned mid-block promenade through the Hills Brothers Coffee complex will connect the waterfront with planned Rincon Hill residential development. The development opportunities below Howard promise the kind of waterfront access downtown San Francisco is denied because of the Embarcadero Freeway.

Hills Plaza Archway Access portals to the waterfront. The city's Rincon Hill plan proposes a pedestrian corridor from a new Rincon Hill housing district which would flow through the archways of Hills Plaza to the waterfront edge.

·PIER·24·
RECREATION REST

Pier 24 Bulkhead An example of the waterfront's historic bulkheads.

South Beach Housing New South Beach high-density residential blocks focus on the waterfront, adjoining the Turnaround project area. Providing waterfront access, open space and recreation opportunities for this new residential neighborhood will be important amenities for this development.



Rincon Point Redevelopment viewed looking south from the MUNI Trolley Bus Turnaround. New commercial facilities will attract visitors to the waterfront area. The waterfront will provide recreational and open space amenities for residents and downtown workers and visitors.

FIGURE 3.5-6

the base of the Embarcadero Center office buildings, one of the most successful redevelopment projects in the United States. Justin Herman Plaza includes a large central area with the Vaillancourt Fountain as its major design feature, and a smaller park grassy area below Market (see Figure 3.5-1). The pedestrian access to the Ferry Building separates these two parts of the plaza at Market Street (see Figure 3.5-2). A small stage area and cafe seating are features of the larger and more successful section of the Plaza. Street merchants and lunchtime office worker gatherings create an exciting urban scene during weekdays. Concerts and other performances at the stage area help to generate excitement and activity evenings and weekends. The landscaping of Justin Herman Plaza is designed to serve as a buffer against the Embarcadero Roadway and Freeway. This buffer is emphasized in the bermed grassy area below Market Street. Views are limited toward the waterfront at this location where buffering the freeway and roadway are emphasized. Justin Herman Plaza focuses attention away from the waterfront edge and inward towards the built environment of downtown. Justin Herman Plaza could be enlarged with realignment of the Embarcadero Roadway.

The Bayfront Promenade, however, seeks to maximize the visual and physical access to the bayside waterfront. The Promenade design seeks to link the downtown built environment with the open water and sky vistas of the San Francisco Bay. The Promenade provides seating areas for passive activities, and different levels for walking or running along the waterfront (see Figure 3.5-3). With its elegant use of simple design elements, including classic streetlights, seating areas, flag poles and steps to varied levels, the Promenade is very noticeable amidst the visual jumble of the waterfront. By means of this visual openness and clarity, the Promenade invites physical accessibility and rewards the visitor with simplicity and openness. The Rincon Point Park extension of the Promenade, to be built immediately inland following the proposed realignment of the Embarcadero Roadway, will expand this bayside open space amenity.

A hard surface walkway along the South Beach Marina shoreline includes pedestrian access along a jetty at the south end of the marina and public fishing and restroom facilities. A five- to seven-acre park for predominantly soft-surface public recreational use will be added inland of the South Beach Marina at a future date. Additional pedestrian access and open space are proposed for the South Beach Redevelopment area by the closure of streets to through traffic and other improvements.

HISTORICAL/ARCHITECTURAL FEATURES

The major structures in the Turnaround Project area of historical and cultural distinction are the Ferry Building, Hills Brothers Coffee, the Audiffred Building within East Street Row, the Agricultural Building, Rincon Annex, and the San Francisco-Oakland Bay Bridge. These manmade structures add visual character and distinction and provide an essential sense of place along the waterfront and for the entire City (see Figure 3.5-3). Historic properties in the project area are discussed in greater detail in Section 3.13.

The Ferry Building, with its alignment at the foot of Market Street, is a regional landmark clearly visible among the towering high-rises, from the Bay and Twin Peaks ends of the Market Street corridor (see Figure 3.5-2).

Planned interior renovations are expected to expand the Ferry Building's commercial spaces.

The Bay Bridge is perhaps the most dominant manmade structure in San Francisco. It is the visible destination or origin of all trans-Bay commuters. Its alignment in the City provides a major vista of the urban form of San Francisco. From Twin Peaks at night, the newly lighted structure is in contrast to the downtown built environment. Its design excellence enhances the Bay Bridge's symbolic importance to San Francisco. In the Turnaround Project study area, the bridge is the dominnant manmade element. At a scale larger than the immediate area, it is visible from multiple perspectives and vistas. It is a region-wide transportation corridor and structure that floats high above the rest of the built environment of the study area, anchored to Rincon Hill structurally and providing the dominant visual image in the study area (see Figure 3.5-3).

By contrast, all of the East Street Row buildings appear to be historical relics of nineteenth-century downtown San Francisco (see Figure 3.5-4). Surrounded by the towers of One Market Plaza, Embarcadero Center and the elevated Embarcadero Freeway structure, the East Street Row buildings provide a model of human scale buildings amid overwhelming surroundings. As an ensemble, these buildings demonstrate the scale and rich variety of San Francisco blocks up to World War II (see Figure 3.5-5). The new Bayside Plaza complex, on the southern end of the block, successfully maintains the scale and order of the older buildings in the Row (see Figure 3.5-5) and provides a suitable anchor for the block.

The Hills Coffee complex at Harrison and The Embarcadero is a block square and includes a brick office building with loading docks facing onto The Embarcadero and a brick arcade extending beyond the building to an area of the complex where a new office building is being constructed. The Hills facility, although no longer a coffee roasting factory, is an example of the warehouse and industrial facilities that characterized the San Francisco waterfront and South of Market for much of the City's history. A large and handsome structure, the Hill's Coffee facility dominates the large waterfront open space below the Embarcadero Freeway and is a satisfying reminder of the industrial and processing history of the South of Market district (see Figure 3.5-6). The historic Hills Brothers Coffee Building is a designated San Francisco City Landmark and National Register property (Table 3.13-1).

VIEWS

The clarity of connections between land and and water contributes to the perception that the waterfront is readily available as a relief or counterpoint to the density of San Francisco's urban development. The opportunity of view water contributes to the perceived accessibility of the water's edge. Visual access to water and water-related activity may be as important as physical access to the water. Views of ship masts, bridges, piers and bulkheads, and related sounds such as ship and fog horns help maintain and enhance a sense of the waterfront. Various north-south streets offer open views to the Bay. The elevated Bay Bridge and Embarcadero Freeway afford travelers the views of the City, the waterfront, and the Ferry Building. Waterfront views can be seen from points inland of the Embarcadero Freeway. However, from many parts of the City's Financial District, the Embarcadero Freeway and densely grouped high-rise buildings block pedestrian-level views to the waterfront area.

CONCLUSION

The project plans for South Beach Redevelopment Area housing blocks, the Rincon Point high-rise housing, and the City's proposal for a high-rise housing district on Rincon Hill, all specify enhancement of visual and physical access to the waterfront to provide recreational and open space facilities for the residents of these new residential neighborhoods. Further, the City's Embarcadero Roadway and Turnaround Project Plans also seek to maximize visual and physical access to the waterfront. The goal of all development plans in the Turnaround Project area is to relate these urban design elements in a coordinated program to enhance visual character and waterfront access. The Turnaround study area between Howard and Brannan, presenting essentially an empty stage, provides the best opportunity along the San Francisco bayfront, to coordinate public planning and expenditures to achieve a cohesive visual and physical connection between the waterfront natural areas and the new City districts and facilities being developed.

North of Howard, the assembled urban waterfront environment, including the elevated Embarcadero Freeway, can be expected to remain in place for the indefinite future. South of Howard, a new roadway alignment, the Turnaround Project facility, new open spaces, and residential neighborhood developments will create a new and more accessible waterfront district in San Francisco during the next ten years. The special location of the Turnaround Project gives particular significance to the need for sensitive urban design treatment of the Turnaround Project facilities in conjunction with The Embarcadero Roadway Project. (See Section 4.5, "Urban Design," for discussion of urban design impacts and mitigation measures.)

3.6 AIR QUALITY

3.6.1 RELEVANT POLLUTANTS

The MUNI Metro Turnaround Project is located in the central portion of the San Francisco Bay Area Air Basin. The San Francisco Bay Area Air Basin is designated, under provisions of the 1977 Clean Air Act, as a nonattainment area for two pollutants, ozone (O3) and carbon monoxide (CO). Nonattainment refers to those areas that, by virtue of their air pollution trends, violate one or more of the National Ambient Air Quality Standards (NAAQS). The Bay Area Air Quality Management District (BAAQMD) monitors the concentration of pollutants at 24 sites within the Bay Area Air Basin. The nearest monitoring site is approximately three miles from the project area. These data indicate that infrequent violations of the NAAQS for oxidant, CO and TSP have occurred within the City of San Francisco in the last six years.

TRANSPORTATION RELATED POLLUTANTS

A summary of existing emissions from mobile and stationary sources in San Francisco is presented in Table 3.6-1. These data indicate that mobile sources (i.e., motor vehicles) account for a large portion of the CO, hydrocarbons, nitrogen oxide and particulate emissions in the City. It is the chemical reaction of hydrocarbons with nitrogen oxides, in the presence of sunlight, that produces photochemical oxidants, primarily ozone.

The two most important traffic parameters affecting transportation related pollutants are total vehicle miles of travel (VMT) and average operating speed. A reduction in VMT and/or an increase in operating speeds (especially during peak commute periods) can result in reduced emissions of hydrocarbons, which combine with oxygen to produce CO and ozone in the atmosphere (although NOx emissions increase with increased operating speeds due to increased fuel consumption). Reduced operating speeds are currently characteristic of several congested roadways which carry large peak hour volumes in the vicinity of the MUNI Metro Turnaround project area.

As stated earlier, the BAAQMD monitoring stations in San Francisco have recorded very few violations of State air pollution standards over thus five years (see Table 3.6-2). Even with the large volumes of traffic in the vicinity of the project area, San Francisco had only one violation for 1987. Additionally, no violations of the lead standard occurred in the County of San Francisco for the year 1986. The State standard is 1.5 micrograms per cubic meter for a 30 day average. The BAAQMD monitoring stations in San Francisco reported monthly averages ranging from 0.23 to 0.05 micrograms per cubic meter for 1986. This is well below the State standard.

The most significant pollutant due to operational emissions, at the local level, is carbon monoxide. Table 3.6-3 summarizes the existing CO concentrations due to the average daily traffic (ADT) and due to the peak hour traffic on several streets in the proposed project area. The existing CO concentrations were calculated using a simple, low traffic volume dispersion model from the BAAQMD's Guidelines for Assessing Impacts of Projects and Plans (1985). The total carbon monoxide concentration at street level is the sum of the concentration due to vehicle emissions and the background concentration. The background eight hour carbon monoxide concentration, obtained from BAAQMD

TABLE 3.6-1. EMISSION RATES FOR SAN FRANCISCO (TONS PER DAY)

POLLUTANT * SOURCE TYPE	INVENTORY YEAR 1982	 1983
Carbon Monoxide (CO)		
* Mobile	251	221
* Stationary	24	28
* All	275	250
Hydrocarbon (Hc)		
* Mobile	27	31
* Stationary	30	27
* All	57	58
Nitrogen Oxides (NOx)		
* Mobile	29	29
* Stationary	35	13
* All	64	42
Sulfur Oxides (SOx)		
* Mobile	8	12
* Stationary	3	1
* All	11	13
Particulates (TSP)		
* Mobile	24	42
* Stationary	28	24
* All	52	66

Source: BAAQMD, Air Quality and Urban Development Guidelines for Assessing Impacts of Projects and Plans, 1985.

TABLE 3.6-2. VIOLATIONS OF AIR POLLUTION STANDARDS AT SAN FRANCISCO MONITORING STATION, 1983-1987

POLLUTANT AND CURRENT STANDARD	NUMBER OF DAYS EXCEEDING STANDARDS				
	1983	1984	1985	1986	1987
Ozone (O_3) 12 pphm for 1 hour: (F)	1	0	0	0	0
Carbon Monoxide (CO) 9 ppm for 8 hours: (F)	0	1[b]	3[b]	2[b]	1[b]
Nitrogen Dioxide (NO_2) 25 pphm for 1 hour: (S)	0	0	0	0	0
Sulfur Dioxide (SO_2) 50 pphm for 1 hour or 5 pphm for 24 hours: (S)	0	0	0	0	0
Total Suspended Particulate (TSP) 150 $\mu g/m^3$ for 24 hours or 50 $\mu g/m^3$ annual geometric mean: (S)	4[c]	1	1	0[d]	0[d]

Source: BAAQMD, Contaminant and Weather Survey, 1983-1987

(S): State Standard (F): Federal Standard

$\mu g/m^3$: micrograms per cubic meter of air

a: 900 23rd Street until September 1986
10 Arkansas Street after September 1986

b: Micro-scale site for streetlevel CO maximums

c: 100 $\mu g/m^3$ for 24 hours or 60 $\mu g/m^3$ annual geometric mean

d: Particulate Matter - 10 micron (PM10)
150 $\mu g/m^3$ for 24 hours or 50 $\mu g/m^3$ annual geometric mean

TABLE 3.6-3. EXISTING 1987 TOTAL CONCENTRATIONS FOR CARBON MONOXIDE

STREET	CROSS STREETS	ADT	PEAK HOUR	CO 8 HOUR(a)	CO 1 HOUR(a)
Embarcadero	Folsom & Howard	13,064	1,300 (b)	10.5 ppm	15.0 ppm
Embarcadero	Brannan	21,764	2,384	14.4 ppm	20.6 ppm
Embarcadero	Market & Mission	21,376	2,470	14.4 ppm	21.1 ppm
Steuart	Howard & Folsom	2,147	240	6.8 ppm	9.8 ppm
Steuart	Market & Mission	3,863	297	7.1 ppm	10.1 ppm
Spear	Mission & Howard	5,299	499	7.9 ppm	11.3 ppm
Spear	Howard & Folsom	4,065	410 (est.)	7.5 ppm	10.8 ppm

Assuming 15 mph average speed and 1987 CO emission factor, 43.39 grams/mile.

ppm: parts per million.

(a) Includes background concentrations.

(b) Peak hour estimates based on 10 percent of ADT.

Traffic Figures Source: San Francisco Public Works Department, Traffic Engineering Department

Source: Earth Metrics Incorporated, 1988.

isopleths for 1987, is 5.8 ppm while the background one hour CO concentration is 8.3 ppm. An isopleth is a graph showing the occurance or frequency of any phenomena as a function of two variables, in this case location and concentration of CO.

The State standards for carbon monoxide concentrations are 9.0 ppm for the eight hour averaging period and 20 ppm for the one hour averaging period. The calculations in Table 3.6-3 suggest that CO levels along The Embarcadero between Market and Howard may be in excess of this standard. Actual site monitoring would be needed to verify this assumption.

The peak hour traffic figure for Steuart Street between Market and Mission Streets, listed in Table 3.6-3, may include trolley bus traffic. Hence the calculated values for the existing total carbon monoxide concentrations for this section of Steuart Street may be slightly elevated.

The sensitive receptors that are exposed to these street level concentrations include users of Justin Herman Plaza and Bayfront Promenade. Additionally, considerable pedestrian traffic in the vicinity of the project site occurs throughout the day.

3.6.2 REGIONAL COMPLIANCE WITH STANDARDS

The Association of Bay Area Governments, Metropolitan Transportation Commission, and Bay Area Air Quality Management District have submitted an attainment plan to the California Air Resources Board to respond to the nonattainment status of the San Francisco Bay Area Air Basin. Although, based on readings from the City's monitoring sites, the City of San Francisco is in compliance with State and Federal standards, the Bay Area region (San Francisco Bay Area Air Basin) is not.

STATE IMPLEMENTATION PLAN

The California Air Resources Board, coordinating agency for State subregional attainment plans, in turn, submitted the California State Implementation Plan (SIP) to the U.S. Environmental Protection Agency. The purpose of air quality attainment planning was to identify and implement control measures adequate to meet the National Ambient Air Quality Standards by 1987, the extended target date legislated in the Clean Air Act Amendments of 1977. Measures to reduce hydrocarbons (ozone precursors) and carbon monoxide emissions were included in the SIP for stationary sources and motor vehicles. Biennial inspection and maintenance of motor vehicle emission control equipment was recently added to the SIP.

Although substantial air quality improvements have been realized for both ozone and CO, the San Francisco Bay Area Air Basin did not meet the 1987 attainment deadline. Congress is considering several bills amending the Clean Air Act that deal with the nonattainment issues.

3.7 NOISE AND VIBRATION

3.7.1 EXISTING NOISE AND VIBRATION SOURCES

Noise sources affecting the project area include vehicle traffic on the Embarcadero, the James Lick Skyway (State Route 480) and the Bay Bridge. Vehicle traffic on roads leading into and terminating in the project area, including Steuart, Spear, Market, Mission, Howard, Folsom, Harrison, and Bryant Streets also contribute as noise sources. An on-site inspection did not reveal any strong vibration sources above ground. Construction activities presently occurring in the project area may also contribute to the existing sound levels. Sensitive receptors in the area include the Justin Herman Plaza along Steuart Street near the Ferry Building and the Hills Plaza Project between Folsom and Harrison Streets.

3.7.2 EXISTING NOISE LEVELS AND RECEPTORS

To quantify the existing sound levels in the project area, six 30 minute noise measurements were taken at the following locations and times:

1) near the corner of Market and Steuart (office building land use), 11:05 to 11:35 A.M.;

2) near the corner of Mission and Embarcadero (park land use), 11:51 A.M. to 12:21 P.M.;

3) near the corner of Howard and Embarcadero (park land use), 12:35 to 1:05 P.M.;

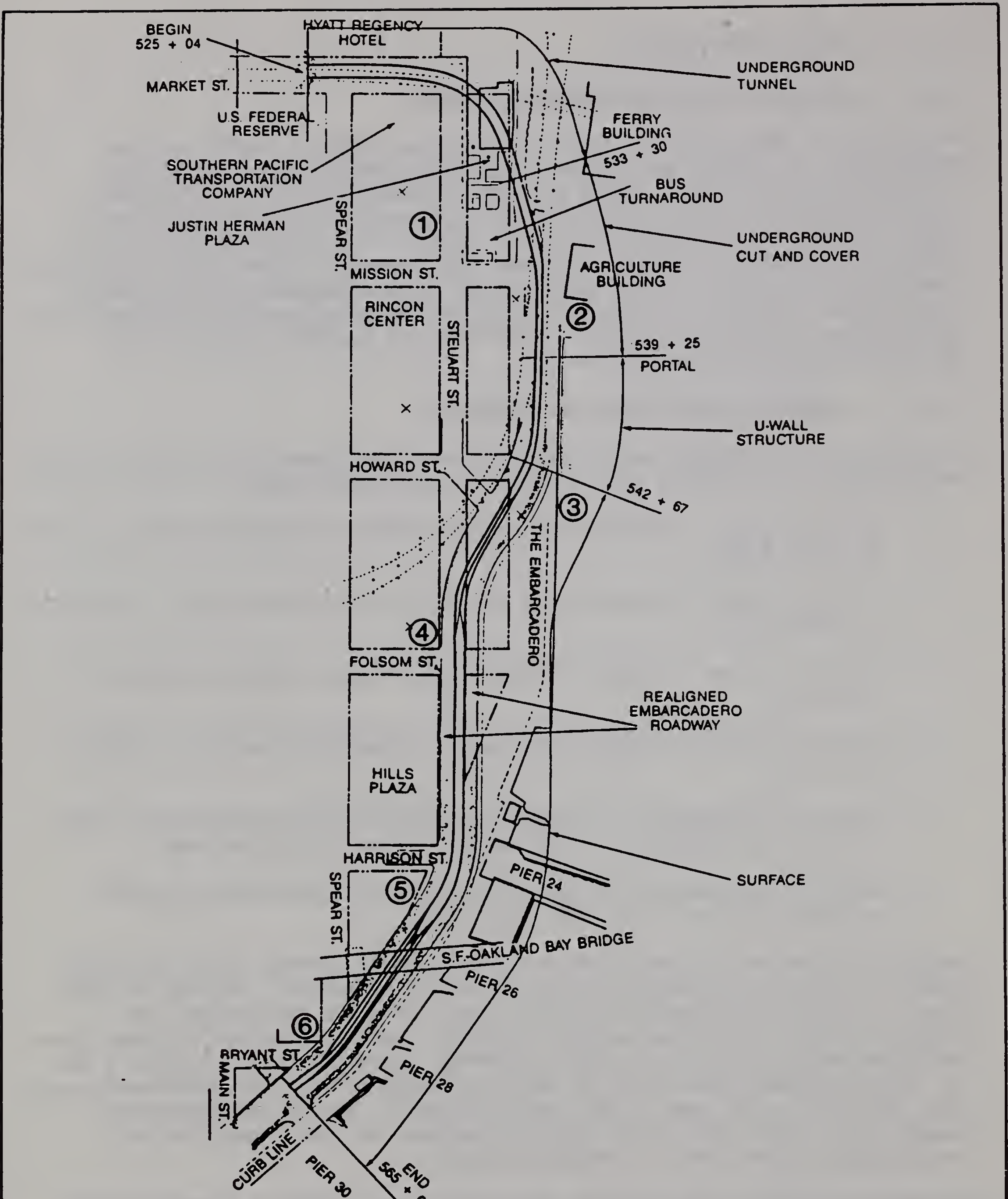
4) near the corner of Folsom and Steuart (commercial land use), 10:44 to 11:14 A.M.

5) near the intersection of Harrison and Steuart with Embarcadero (office building and residential land use), 11:27 to 11:57 A.M.; and

6) near the intersection of Spear and Bryant with Embarcadero (office building land use), 12:10 to 12:40 P.M.

These locations were chosen so as to be along major streets, to be near any sensitive receptors in the project area, and to represent a variety of land uses. The sensitive receptors include the Hills Plaza residential and commercial complex near measurement locations 4 and 5, the Justin Herman Plaza near measurement location 1, and the Bayfront Promenade near locations 2 and 3. The measurement locations are shown in Figure 3.7-1. The measurement data were obtained in the form of the Leq noise scale. Leq is the equivalent steady state sound level which contains the same acoustic energy as the varying sound level over the measuring period.

The instrument used for the noise measurements was a Bruel & Kjaer Precision Integrating Sound Level Meter Type 2230. The instrument continuously averages the varying sound pressure levels over the period of monitoring. Calibration was performed before the sampling utilizing a Bruel & Kjaer Calibrator Type 4230. The monitoring results are presented in Table 3.7-1.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525 + 04
HYATT REGENCY
HOTEL
MARKET ST.
U.S. FEDERAL
RESERVE
SOUTHERN PACIFIC
TRANSPORTATION
COMPANY
JUSTIN HERMAN
PLAZA
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MISSION ST.
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TUNNEL
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BUS
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THE EMBARCADERO
④
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REALIGNED
EMBARCADERO
ROADWAY
HILLS
PLAZA
SURFACE
HARRISON ST.
PIER 24
⑤
SPEAR ST.
S.F.-OAKLAND BAY BRIDGE
PIER 26
⑥
BRYANT ST.
MAIN ST.
PIER 28
CURB LINE
PIER 30
END
565 + 06

SOURCE: EARTH METRICS INCORPORATED

SCALE

FIGURE 3.7-1 SOUND MEASUREMENT LOCATIONS

TABLE 3.7-1. MEASURED SOUND LEVELS IN THE PROJECT AREA

LOCATION	DATE AND START TIME	DISTANCE(a) FEET	Leq(b) dBA	CNEL(c)	SAN FRANCISCO NOISE STANDARD (d)(e)
1) Steuart and Market	25 March, 1988 11:05 A.M.	10	70	72	70 CNEL
2) Mission and Embarcadero	25 March, 1988 11:51 A.M.	30	77	79	70 CNEL
3) Howard and Embarcadero	25 March, 1988 12:35 P.M.	6	74	76	70 CNEL
4) Steuart and Folsom	29 March, 1988 10:44 A.M.	20	69	71	70/60 CNEL
5) Harrison and Steuart	29 March, 1988 11:27 A.M.	30	73	75	70 CNEL
6) Bryant and Spear	29 March, 1988 12:10 P.M.	15	73	75	70 CNEL

(a) Distance from the center line of the near traffic lane.

(b) Adjusted for peak hour levels.

(c) Community Noise Equivalent Level.

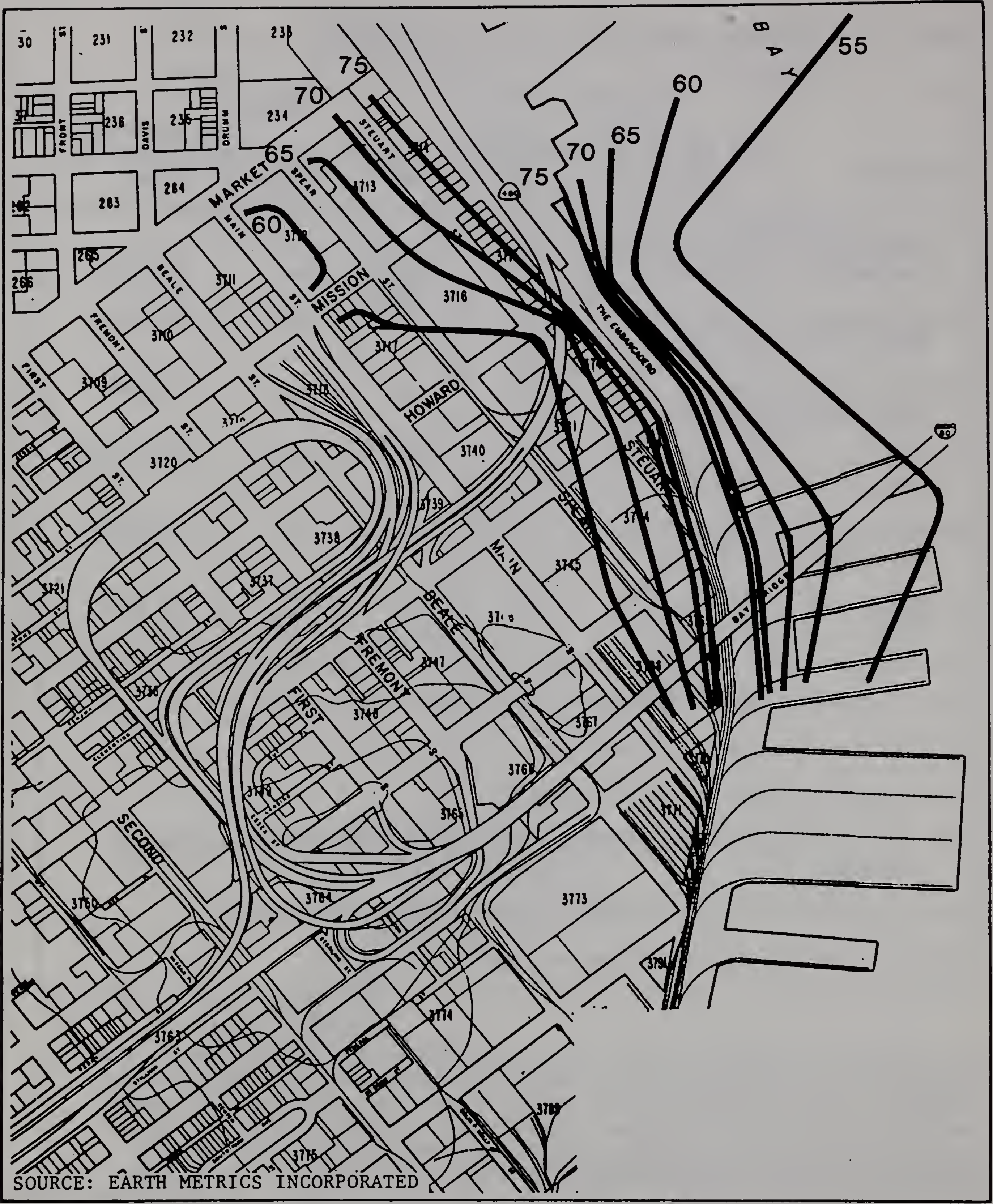
(d) City of San Francisco, Comprehensive Plan, Environmental Protection Element.

(e) 70 CNEL for office buildings, 60 CNEL for residential uses.

Source: Earth Metrics Incorporated, 1988.

For purpose of evaluation against the City of San Francisco standards, the Community Noise Equivalent Level (CNEL) descriptor was calculated from the measured Leqs in accordance with typical diurnal traffic trends and sound level statistical distributions. The CNEL is a 24 hour equivalent energy sound level (Leq) which accounts for the greater annoyance potential of nighttime noise by weighting nighttime sound levels greater than daytime levels.

Sound level contours in terms of the CNEL were developed from the measurement data and are shown in Figure 3.7-2.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MARKET
MISSION
HOWARD
STEUART
SPEAR
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SECOND
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DAVIS
DRUMM
THE EMBARCADERO
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SOURCE: EARTH METRICS INCORPORATED

N

SCALE

FIGURE 3.7-2 EXISTING SOUND LEVEL CONTOURS IN CNEL

Sensitive receptors in the area include the Justin Herman Plaza and the Bayfront Promenade. Both of these areas support increased pedestrian traffic during the midday hours. As shown in Table 3.7-1, the existing sound level is approximately 69 dBA peak hour Leq in the area of the Justin Herman Plaza.

3.7.3 NOISE STANDARDS AND EVALUATION OF EXISTING LEVELS

The City of San Francisco Comprehensive Plan Environmental Element (1973) has identified sound level criteria for different land use categories. These standards are generally similar to the State of California recommended land use compatibility guidelines for similar land uses.

A comparison of the existing CNEL values, as shown in Table 3.7-1, with the City of San Francisco recommended compatibility levels indicates that the existing noise levels at the residential and office building sound receptors are in excess of the "satisfactory" range (above 70 CNEL; see the "SAN FRANCISCO NOISE STANDARD" column of the table, from page 19 of the Environmental Protection Element). However, the San Francisco Noise Ordinance does not include these standards nor contain specific absolute limits on ambient noise levels. The Ordinance has a "nuisance" provision that prohibits intruding noises which exceed the existing ambient levels by 5 dBA.

3.8 ENERGY

3.8.1 REGIONAL ENERGY DEMAND

The energy setting of California and the nation is a critical one of increasingly higher energy costs and depleting nonrenewable energy supplies. The energy problem is compounded by growth and increasing demand for energy resources. State and Federal policy seeks resolution through energy conservation and development of alternate energy sources. Specifically, Powerplant and Industrial Fuel Use Act of 1979 and Executive Order 12185, Conservation of Petroleum and Natural Gas, require Federal agencies which administer programs of financial assistance to take actions which maximize the efficient use of energy and conserve natural gas and petroleum in programs funded by those agencies. The degree of success or failure in energy consumption depends on coordinating local and regional policies and fostering public awareness. Federal funding for programs in these areas has been reduced considerably during the current administration.

Table 3.8-1 presents the statewide electricity sales for the 12 month period ending in December for the years 1982 through 1987 as reported to the California Energy Commission by the five major utility companies of California. Although electricity sales leveled off during 1986, statewide electricity consumption is expected to increase due to population growth, additional agricultural need, particularly water pumping, and industrial expansion.

TABLE 3.8-1. STATEWIDE ELECTRICITY SALES (12 MONTH ENDED THROUGH DECEMBER, BILLIONS OF KILOWATT HOURS)

1982	1983	1984	1985	1986
145.0	146.7	156.0	159.0	159.0

Source: Energy Watch, California Energy Commission, 1983-1987

3.8.2 LOCAL SETTING

The MUNI Metro system electrical requirements are supplied by the Hetch Hetchy Project. The Tuolumne River watershed supplies the water resources for the Kirkwood, Holme, and Moccasin hydroelectric generation stations of the Hetch Hetchy system. The electricity is "dumped" onto the Pacific Gas and Electric Company's (PG&E) transmission lines at Newark and is wheeled across the Bay to MUNI Metro substations. The substations transform the electricity from 12,000 volts AC to 600 volts DC, which meets the operational energy requirements of the light rail vehicles. By metering the amount of electricity that the Hetch Hetchy system supplies at Newark and by metering the amount of electricity that the MUNI Metro substations draw from the PG&E transmission lines, the energy consumption of the MUNI Metro system can be directly related to Hetch Hetchy production.

3.8.3 MUNI METRO ENERGY REQUIREMENTS

Table 3.8-2 presents the energy consumption information for the San Francisco Municipal Railway for the year ending December 1983. The table shows energy consumption by mode and by energy source, number of revenue vehicles, and revenue vehicle miles.

The category Streetcar (SC) represents the energy consumption required by daily operation of the MUNI Metro light rail system. Streetcars have only been operated as historic vehicles along Market Street and on The Embarcadero from the Ferry Building to Fisherman's Wharf during the summer months.

TABLE 3.8-2. MUNI ENERGY CONSUMPTION, 1983

MODE	MB	SC (a)	TB	CC
Number of Revenue Vehicles	526	140	345	41
Gallons of Diesel Fuel (Thousands)	5086.9	-	-	-
Kilowatt Hrs. of Electricity (Millions)	-	49.8	23.4	1.4
Revenue Miles (Millions)	19.1	6.7	8.7	0.9

MB = Motorbus
SC = Streetcar or Light Rail
TB = Trolleybus
CC = Cable Car

Source: National Urban Mass Transportation Statistics, U.S. Department of Transportation, 1984

(a) The vast majority of MUNI vehicles in this category are Light Rail.

3.8.4 ENERGY REQUIREMENTS FOR EXISTING BUS SERVICE IN THE PROJECT AREA

The fraction of the revenue vehicle miles traveled in the project area is insignificant when compared to the total number of revenue vehicle miles for the entire MUNI system. Consequently, the energy requirements for existing bus service in the project area play a negligible role in forecasting energy impacts.

3.9 EXISTING STRUCTURES AND GEOTECHNICAL CONDITIONS

3.9.1 GEOLOGY AND SITE HISTORY

The alignment of the MUNI Metro Turnaround Facilities, from Market Street near Spear Street to Steuart Street near Folsom Street, is on reclaimed lands which were originally part of Yerba Buena Cove in San Francisco Bay. The original 1853 shoreline crossed Market Street near First Street, and Spear Street between Folsom and Harrison Streets. A map showing the location of the original shoreline in relation to the MUNI Turnaround Facilities is presented in Figure 3.9-1.

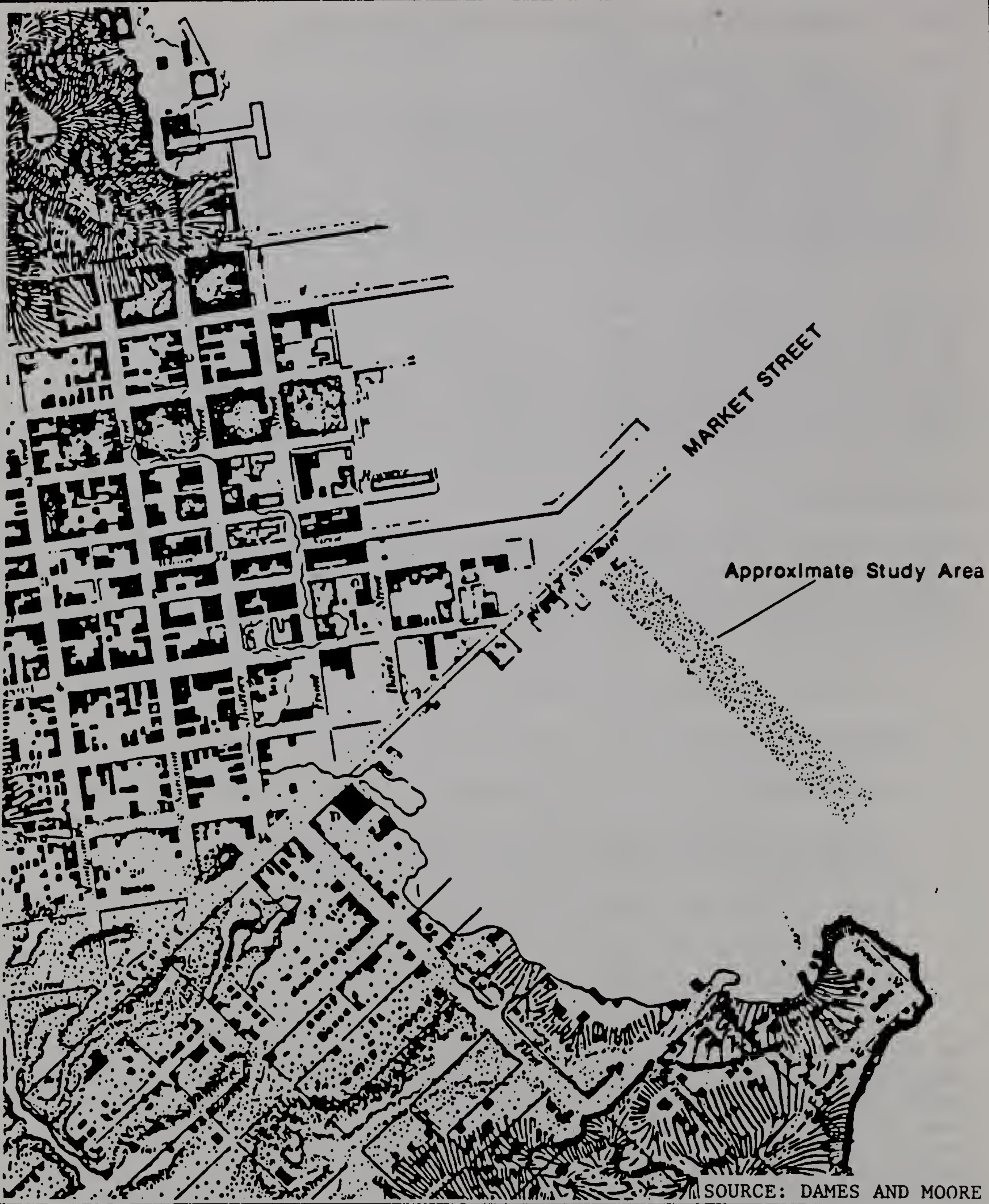
Because of the distances of various parts of the MUNI alignment from the old shoreline and from the nearest rock outcrop on Rincon Hill, subsurface conditions vary considerably along the alignment. The depth to bedrock below street grade ranges from a minimum of about 70 feet south of Howard Street on Steuart Street to a maximum of about 280 feet in the center of a rock valley along the Embarcadero between Market and Mission Streets. At the east end of the MUNI/BART Embarcadero Station, rock is also very deep, about 260 feet.

SUBSURFACE STRATA

Major subsurface strata underlie the MUNI Turnaround alignments between street grade and bedrock. Due to the greater than 200 foot difference in depth to rock, the thickness of these strata varies considerably and some of the deeper geologic sediments are missing where rock is less than 100 feet below surface. In increasing depth below street grade, these strata are:

- Fill including an old rock seawall;
- Recent Bay Mud primarily deposited in the last 7,000 years;
- Interbedded sands and clays deposited from 10,000 to 80,000 years ago;
- Old Bay Clays similar to the Recent Bay Mud but of greater shear strength and lesser compressibility, about 80,000 to 125,000 years old;
- Lower alluvial and colluvial sediments (probably less than 200,000 years old); and,
- Franciscan Bedrock of Upper Cretaceous to Jurassic Age (65 to 200 million years old).

The upper two strata, fill and Recent Bay Mud, are of much greater significance than the lower strata in the design and construction of the MUNI facilities. The fill materials consist primarily of loose to medium dense sand fills and rubble and vary from 15 to 40 feet in thickness. The old rock seawall is believed to be a maximum of 40 feet thick from crest to base and it is overlain by about 10 feet of sandy fill. The old seawall extends south of Market Street to within 50 feet of Howard Street. It is located westerly of the new seawall which currently defines the eastern limit of filled ground. Portions of both the underground and surface alignments will require excavations and pile driving into and through the old seawall. Approximate


MARKET STREET
Approximate Study Area

SOURCE: DAMES AND MOORE

N
SCALE

FIGURE 3.9-1 SAN FRANCISCO BAY SHORELINE AT MARKET STREET IN 1853

location of the seawalls and sampling sites for the geologic evaluation can be found in the Draft Factual Report Site Investigation MUNI Metro Turnaround Facility, Dames & Moore, 1985.

The Recent Bay Mud is a relatively weak and compressible silty clay with sand lenses which underlies the fills and rock seawall, where present. The Bay Mud controls the geotechnical design of the MUNI underground structures. The depth to the bottom of the Bay Mud below street grade increases from about 80 feet at the east end of the Embarcadero Station to a maximum of about 140 feet near the intersection of the Embarcadero and Howard Street. The minimum depth (about 60 feet) to the bottom of the mud is near Folsom and Steuart Streets.

Except for the cut and cover sections whose base is above the bottom of the old rock seawall (mainly between Mission and Howard Streets), the excavations for the turnaround tunnels and underground structures will generally bottom out in the Bay Mud. The deeper geologic units between the bottom of Bay Mud and bedrock consist of sandy and clayey sediments much firmer than the Recent Bay Mud. These deeper strata will provide significant support to piling used to underpin the Embarcadero Freeway and the MUNI box structures, but are not of major significance in evaluating the design and construction of the MUNI tunnels and underground structures. Therefore, they are not described in detail in this EIS.

SITE HISTORY (1848-1870)

Yerba Buena Cove saw very little development before 1848. During the Gold Rush period (1848 to 1853), the lower Market Street area had rapid development. A wharf was constructed on wood pilings along the future alignment of Market Street, as shown in Figure 3.9-1. The wharf area expanded rapidly with construction of piled structures and haphazard filling of adjacent water lots. Over 800 ships were moored or stranded in the Cove during the Gold Rush (Olmsted, 1977). In some locations, ships were abandoned in place and were encapsulated in the manmade fills.

Prior to the onset of intense landfill operations which reclaimed Yerba Buena Cove, the project area was under 12 to 30 feet of water. Filling of Yerba Buena Cove occurred after the City of San Francisco sold beach and water lots in 1847, 1850 and 1852 (Dow, 1973). The City also leased streets to investors willing to build wharves. Once the wharves were built, cross streets were built connecting the wharves. Fill in the general area consisted primarily of a dune sand with other materials including building rubble, trash and debris which was end dumped into the water from railway cars and horse drawn carts.

By 1870, Yerba Buena Cove was essentially filled and a new waterfront established. During this time period, the old seawall was extended to near Howard Street and wharves were developed or redeveloped along the waterfront. Fill was also being placed along Howard and Steuart Streets.

OLD SEAWALL

The Old Seawall, which underlies the Embarcadero Freeway in the MUNI project area, was completed by 1870. It was constructed by excavating a trench about 20 feet deep in the Recent Bay Mud, by dumping stone in the trench, and allowing the stone to settle to a "firm" foundation. The location of the old seawall is not known precisely, but it is expected to encroach on the alignment of the Turnaround Facility.

NEW SEAWALL

The New Seawall was constructed in phases. A 1,000 foot segment from Pacific to Clay was completed by May, 1889. The first segment to be built south of Market, to the foot of Mission, was completed in June, 1890. The section from Folsom to Harrison was finished by May, 1915. Substantial amounts of rubble were incorporated into the new seawall, particularly after the 1906 earthquake and fire. The area between the old seawall and the new, together with the East Street right-of-way, is known as The Embarcadero. It was, and remains, the public part of the Port utilized for moving people and materials to and from the ships, piers and warehouses. The new seawall was completed approximately 75 years following the completion of the Eddy Survey of 1851 and the initiation of work on the old seawall.

SITE HISTORY (1870-1990)

From a geologic and geotechnical engineering standpoint, the site history since 1870 has not been as significant as the earlier years. Considerable settlement, estimated to be up to 10 feet, has occurred in the area of deeper fills and Bay Mud since the area was first filled. Debris from the buildings damaged by the 1868 and 1906 earthquakes was incorporated in the regrading and filling operations following the earthquakes.

3.9.2 GROUNDWATER

The fill material contains free-flowing groundwater. The top of this groundwater occurs at approximately 8 feet below ground surface in the vicinity of the Turnaround.

3.9.3 SEISMICITY/LIQUEFACTION POTENTIAL

San Francisco lies in a tectonically active region, where the North American and Pacific Plates come in contact. This contact region is characterized by northwest trending faults exhibiting mainly right lateral strike-slip movement; that is, the movement is predominantly horizontal with the western side of the fault moving northward with respect to the eastern side of the fault.

The major faults in the region include the San Andreas Fault, the Hayward Fault, and the Calaveras Fault. Several smaller faults occur in the immediate vicinity of the site, the nearest of which is the Seal Cove-San Gregorio Fault. The San Andreas and Hayward Faults are the most likely sources of strong motions.

From 1850 to the present, approximately 400 earthquakes with Richter magnitudes of 4.0 or greater have been reported within about 80 miles of the site. By far the most significant of these events was the April 18, 1906 earthquake with an estimated Richter magnitude of 8.3.

Strong motion earthquake records for the deep Bay Mud conditions present along the proposed MUNI project are very limited. Ground motions were recorded on the Southern Pacific Building at Market and Spear Streets for the 1969 Santa Rosa earthquake of magnitude 4.6, but the ground movements were minimal. Analyses indicate that maximum ground displacements for a 1906 type earthquake on the San Andreas Fault could be up to one foot.

Loose, fine to medium grained clean sands below the water table are particularly susceptible to seismic liquefaction; i.e., a partial to complete loss of strength could occur if the earthquake shaking is strong enough. For the MUNI alignments, the fills comprised primarily of dune sands at depths of 6 to 40 feet below ground surface are likely to liquefy under the design earthquake conditions. Liquefaction of the dune sand fills has been clearly demonstrated at many locations in Yerba Buena Cove. Prior to 1906, ground failures in the Yerba Buena Cove filled land were also observed at several locations due to the October 21, 1868 Hayward Earthquake (Youd and Hoose, 1978). The best documented evidence of liquefaction related failures under the MUNI alignment are those along The Embarcadero during the April 18, 1906, earthquake. Selected excerpts from Table 7 of Youd and Hoose (1978), which demonstrate the severity of ground motions in this area, are presented below:

> "Buildings on the water site, along East Street (now called The Embarcadero) generally slumped seaward, in some cases as much as 2 feet. The damage was greatest close to the water's edge, growing less as the solid land was approached, gradually at first, then more rapidly. These phenomenon seem to suggest that materials used in fill were shaken together (currently interpreted as liquefaction of loose sandy fills), so as to occupy less space with the accompanying development of waves, fissures, and structural damage."
>
> "The area of about eighty feet frontage which has sunk to a maximum of about eighteen inches in front of the Market-street Ferry building and the depression of somewhat greater area and to a maximum depth of about three feet, at the northwest corner of the same building, are the extreme cases of susidence along the main waterfront."

3.9.4 DESCRIPTION OF EXISTING STRUCTURES

BART TUNNELS AND SPEAR STREET VENTILATION SHAFT

General. The BART subway tunnels extend from the Spear Street Ventilation Shaft at the east end of Embarcadero Subway Station to the San Francisco Ventilation Structure of the Transbay Tube directly beneath the Ferry Plaza restaurant. The two 18 foot diamenter circular tunnels were driven in the years 1968 to 1970 by means of a circular steel shield under compressed air. They are located about 60 feet below the surface of Market Street in Recent Bay Mud. During tunnel driving, a great number of abandoned timber piles were intersected by the tunnel and removed by cutting them. In addition, the tunnel passed within a few feet of the bottom of the old seawall at the foot of Market Street and between the pile foundations of the Embarcadero Freeway and the Ferry Building.

The tunnels were driven under compresssed air pressure to control the inflow of groundwater and help support the soil during excavation. The tunnels have flexible steel lining which allow the tunnels to follow the small movements of the surrounding soil caused by settlement, fluctuations in groundwater levels, or other external disturbances. The tunnel lining segements are bolted and caulked to prevent leakage.

Condition of the Tunnels. An inspection trip by project personnel into the BART tunnels conducted on December 15, 1985, indicated that most of the track bed of the tunnels is normally dry; however, there are wet spots on the track bed in some locations. This wetness is caused by water drips from steel tunnel lining. The drips either penetrated through the bolt holes and bolts or came through flanges of the steel segments. Under the Ferry Building, it was observed that the location of leaks through the tunnel lining flanges coincided with an area in the crown of the tunnel where a pile tip of a cut off timber pile is bearing against the tunnel lining. This lining area has been strengthened by a steel angle section welded against the plate of the tunnel lining. It was also observed that a number of one inch high strength bolts connecting the lining segments are corroded. There was also corrosion noted on the segments themselves.

Tunnel Invert Concrete, BART Track and Walkways and Cross Passages. In the bottom of the circular steel tunnels, plain concrete was placed after completion of the tunnel driving to provide a base for the BART tracks. The BART rails were directly attached to a second course of concrete by specially designed fasteners. The fasteners allow some vertical or horizontal track adjustment, whenever that become necessary.

A concrete walkway about two feet above top of rail was installed in each tunnel. The walkway is intended for use during tunnel maintenance and during emergencies. The walkways of the two parallel tunnels are connected by one cross passage between the two tunnels. This cross passage is at about midpoint between Embarcadero Station and the Ferry Building. It allows escape from one tunnel into the other tunnel should emergency conditions such as train fire make such an escape a requirement. Wet standpipes for fire fighting also are brought into the tunnel from the street surface.

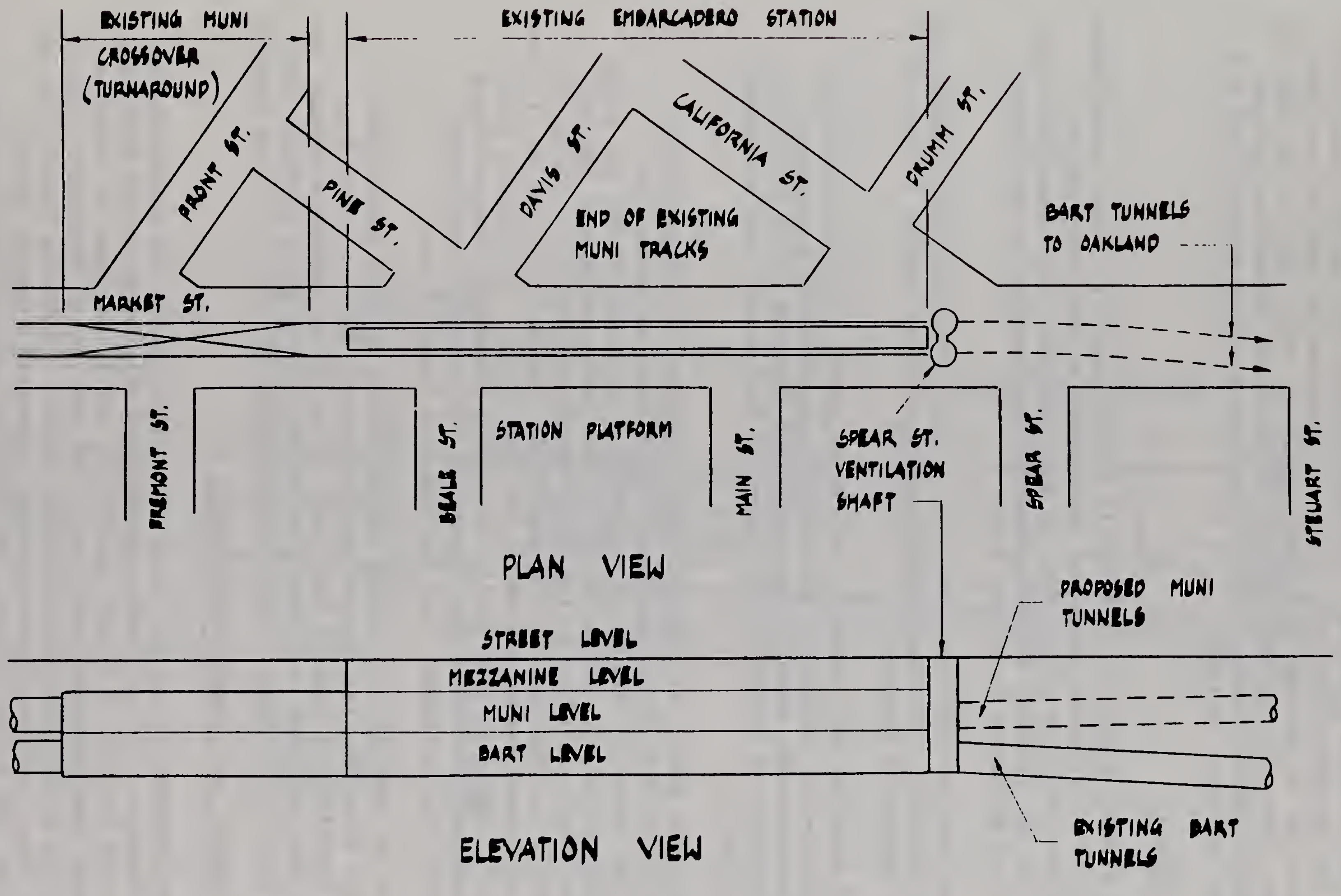
Third Rail and Utilities. 1000 V dc electrical power is conducted in a third rail located next to the track for the propulsion of the Trains. In addition to the third rail power, a waterline, an air pressure line, tunnel drainage pipes, various electrical conduits, and an antenna signal line are located in the tunnel.

Spear Street Ventilation Shaft. The Spear Street Ventilation Shaft is located at the east end of Embarcadero Station. The shaft is a concrete structure which extends from street surface to BART level and houses ventilation fans and ducts, and a drainage sump. The twin BART tunnels were driven from this shaft, flexible seals constructed of neoprene rubber gaskets and steel angles connect the steel tunnel lining to the concrete shaft. The seals are capable of allowing a certain amount of relative movement between the tunnels and the more rigid shaft structure.

During the BART tunnel inspection in December of 1985 the ventilation shaft was also inspected. Special attention was given to the seal connection of the tunnel lining to the concrete shaft structure. It was noted that there is water leakage at the seal which is manifested by wetness and the presence of leached out solids deposited on the trackbed.

MUNI FACILITIES AT EMBARCADERO STATION

The Embarcadero Station under Market Street and between Fremont and Spear Streets is the downtown terminal of the J, K, L, M, and N lines of the MUNI Metro system. MUNI shares the mezzanine level with BART for passenger access and ticketing. The MUNI tracks and platform are located on the level below the mezzanine. BART tracks and platform are located on the lowest level of the station. A diagram of the existing station is shown in Figure 3.9-2.


EXISTING MUNI CROSSOVER (TURNAROUND)
EXISTING EMBARCADERO STATION
FRONT ST.
PINE ST.
DAVIS ST.
CALIFORNIA ST.
DRUMM ST.
END OF EXISTING MUNI TRACKS
BART TUNNELS TO OAKLAND
MARKET ST.
FREMONT ST.
BEALE ST.
STATION PLATFORM
MAIN ST.
SPEAR ST. VENTILATION SHAFT
SPEAR ST.
STEUART ST.
PLAN VIEW
PROPOSED MUNI TUNNELS
STREET LEVEL
MEZZANINE LEVEL
MUNI LEVEL
BART LEVEL
EXISTING BART TUNNELS
ELEVATION VIEW

SOURCE: BECHTEL NATIONAL, INC.

FIGURE 3.9-2 EXISTING MUNI METRO FACILITIES AT EMBARCADERO STATION

The MUNI track level includes a track crossover immediately west of the platform to allow trains to change tracks either before or after reversing direction at the station platform. The MUNI platform has space on each side for loading and unloading four car trains, a supervisor's booth at the west end, and space for the storage of three disabled or ready cars at the east end of each track. The original construction of the Spear Street ventilation shaft included bridges to support MUNI tracks for a future extension of the tracks toward the Ferry Building.

EMBARCADERO FREEWAY

The existing freeway structure is a double decked concrete viaduct constructed in the 1950s and is situated along the Embarcadero at the northeastern shoreline of the peninsula of the City of San Francisco. It passes the Ferry Building on the bay frontage and is bounded on the landside by the Justin Herman Plaza, as indicated in Figure 3.9-3.

The upper deck carries southbound vehicular traffic from both the Broadway and Clay Streets on ramps. The lower deck routes northbound traffic to exit at Broadway and Washington Streets.

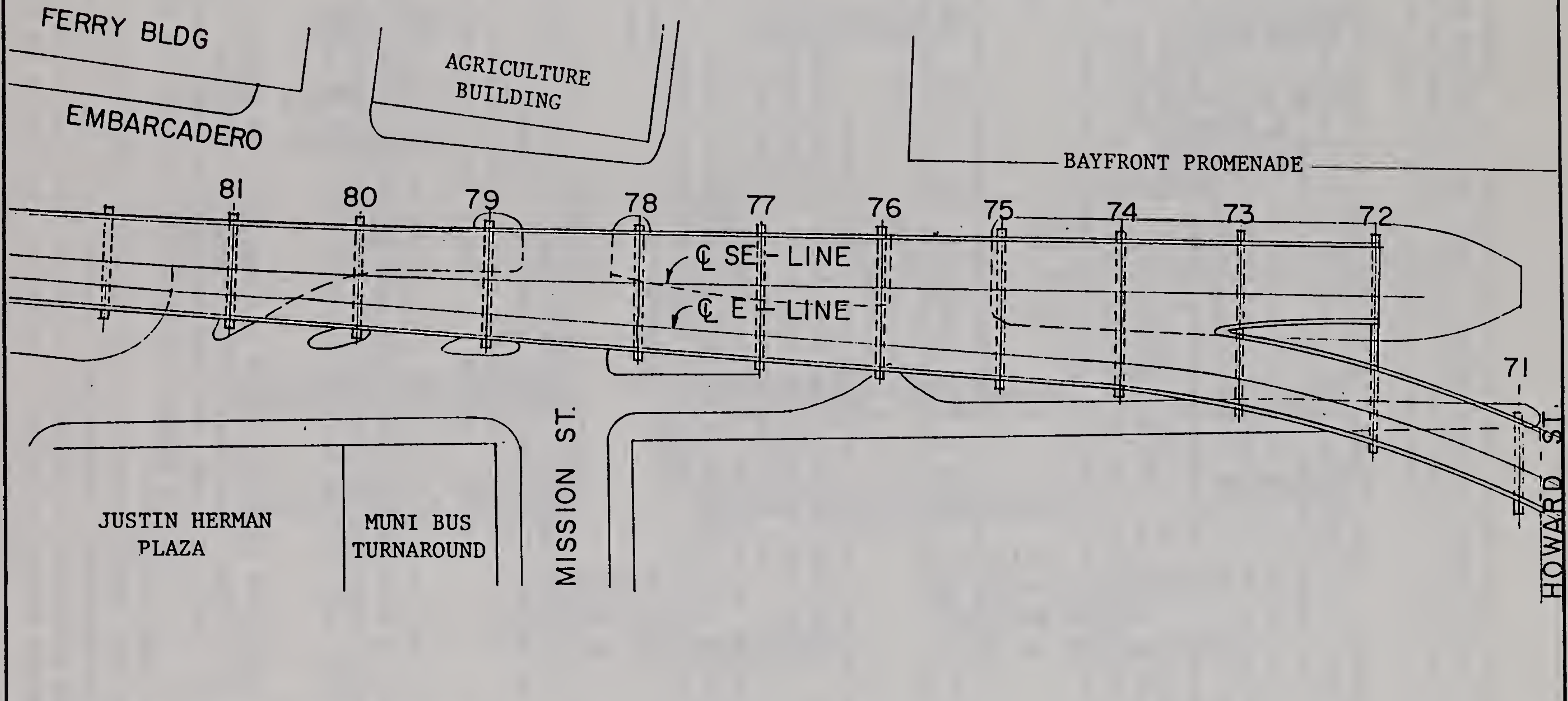
Both elevated decks of the structure consist of poured-in-place reinforced concrete multiple-cell continuous box girders, supported by a number of poured-in-place concrete portal frames which are referred to in this text as bents. The majority of the bents are spaced 75 feet apart, with a maximum spacing of 92 feet.

A total of ten (10) bents are expected to be affected by the projected construction of the MUNI Turnaround Facility, and can be identified consecutively as Bents 72 through 81, starting from Howard Street and going north past Mission Street. Bents 72 and 73 have three columns to the full height of the bents, resulting in two span reinforced concrete girders for both road decks. See Section 1 in Figure 3.9-4. Bents 79, 80 and 81 all have single span reinforced concrete girders for both decks. See Section 3 in Figure 3.9-4. For Bents 74 through 78, the portal frames all have a single span, post tensioned girder for the upper deck and two span reinforced concrete girders for the lower. See Section 2 in Figure 3.9-4.

The columns of the Embarcadero Freeway are supported on pile foundations. Groups of eight steel H-piles support each pile cap. Based on available records from CALTRANS, it appears that most of the piles penetrate through Old Bay Clay into the sands and/or alluvium-colluvium strata above bedrock. To the south of Bent 76, it appears that the piles were driven to or into bedrock.

EMBARCADERO ROADWAY AND INTERSECTING STREETS

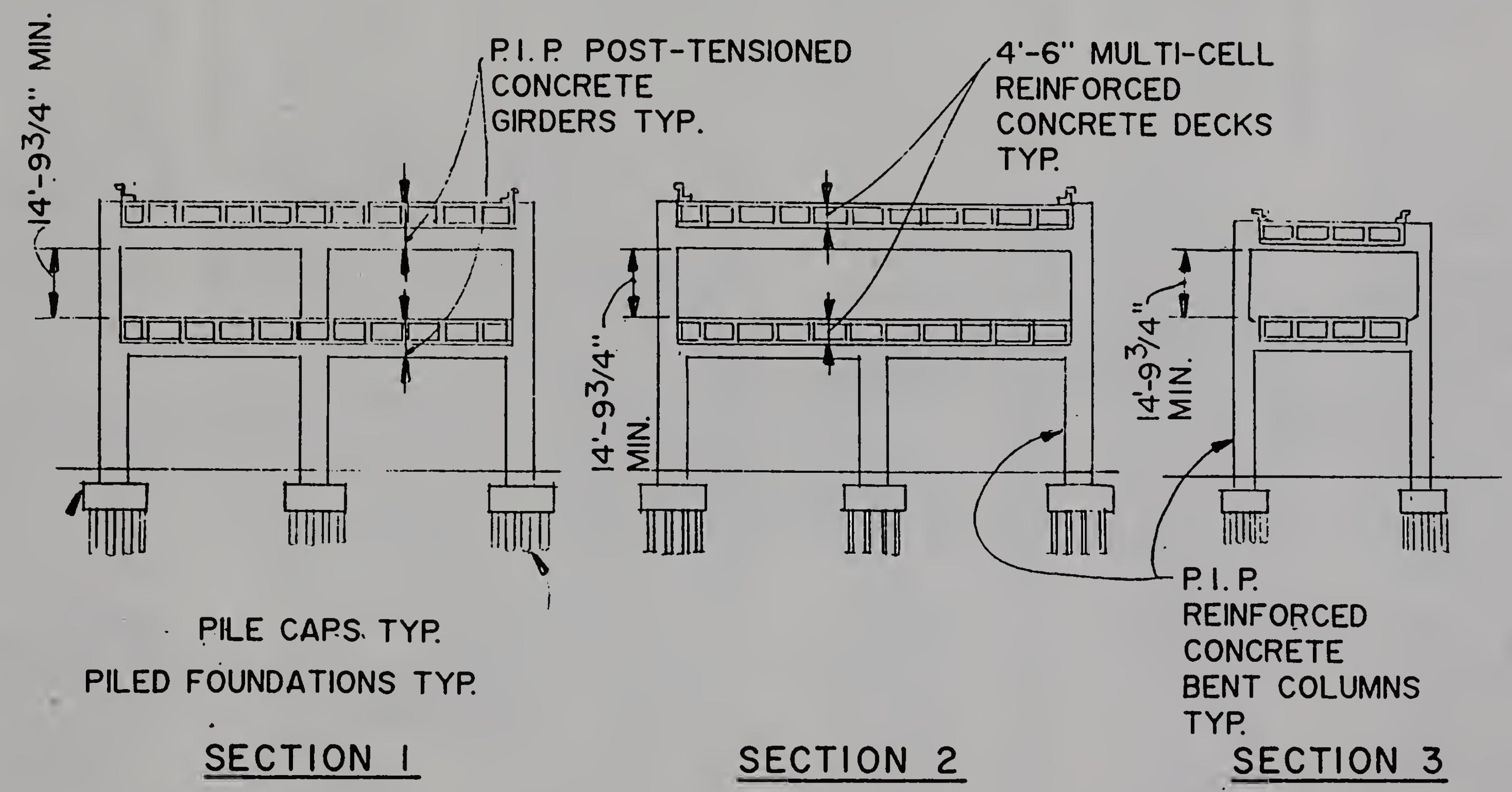
The Embarcadero Roadway is located along the waterfront of the northeastern part of San Francisco. It is flanked by maritime structures on its east side. The structures on its west side are, generally, older buildings of moderate height including some warehouse buildings. The MUNI Metro Turnaround Project extends along The Embarcadero between Market Street and Folsom Street. In the project study area, the Embarcadero Roadway intersects Mission, Howard, Folsom, Harrison, and Bryant Streets, which extend west and away from the waterfront. The Embarcadero Roadway in the project area from Clay to Howard


FERRY BLDG
EMBARCADERO
AGRICULTURE BUILDING
BAYFRONT PROMENADE
81
80
79
78
77
76
75
74
73
72
71
℄ SE - LINE
℄ E - LINE
JUSTIN HERMAN PLAZA
MUNI BUS TURNAROUND
MISSION ST.
HOWARD ST.

SOURCE: T.Y. LIN

SCALE
1" = 100'

FIGURE 3.9-3 PLAN OF EXISTING EMBARCADERO FREEWAY


14'-9¾" MIN.
P.I.P. POST-TENSIONED CONCRETE GIRDERS TYP.
4'-6" MULTI-CELL REINFORCED CONCRETE DECKS TYP.
14'-9¾" MIN.
14'-9¾" MIN.
PILE CAPS TYP.
PILED FOUNDATIONS TYP.
P.I.P. REINFORCED CONCRETE BENT COLUMNS TYP.
SECTION 1
SECTION 2
SECTION 3

SOURCE: T.Y. LIN

SCALE
1" = 40'

FIGURE 3.9-4 TYPICAL CROSS SECTIONS OF THE EXISTING EMBARCADERO FREEWAY

is undernearth or adjacent the elevated double decked Embarcadero Freeway structure, described ealier in the text. The northbound lanes of the Embarcadero Roadway are east of the freeway columns and the southbound lanes pass beneath the west column bay of the freeway structure.

The roadway surface of the four traffic lanes is asphalt paved. Between the northbound and southbound traffic lanes and in the east column bay, the surface is covered with hard gravel base. The Belt Railway tracks are located here. Although the Port has not made a final determination on the future of the Belt Line Railway, the railroad is expected to be relocated away from the freeway structure and toward the waterfront. On either side of both northbound and southbound traffic lanes, curbs and sidewalks are provided in front of the Ferry Building on the east, and in front of the Justin Herman Plaza, the MUNI bus terminal, and the Audiffred and YMCA building on the west. Off street parking spaces are provided adjacent to curbs and under the Embarcadero Freeway structure between the north and southbound traffic lanes.

BUILDING FOUNDATIONS

There are seven buildings between Mission and Howard Streets ranging from two to eight stories high. Most of the buildings have a single basement 10 to 12 feet deep. The foundations of the buildings are briefly described below in sequence from north to south.

The Audiffred building is located at the corner of Mission and Embarcadero. It is a three story building with a penthouse and a single basement. The building was probably constructed around 1890 and survived the 1906 earthquake; it has been designated as a National Register historic landmark and was renovated in 1982. During renovation, only the exterior facade was reformed; a new steel frame was added and the old wood piles were removed and replaced by 10 inch diameter concrete filled pipe piles. The new piles were installed (closed ended) by jacking and penetrated 5 to 10 feet into the sands underlying the Bay Mud.

The 113-115 Steuart building, immediately south of the Audiffred building, is a two story brick building with a single basement (finished floor slab, elevation -7.9 feet, CCSF datum). The building is apparently supported on wood piles but no details on the building structure framing or pile foundations are available at this time.

The Jewish Community Federation building is a relatively new building (constructed in 1982) and is seven stories high. It is supported on 12 inch square, prestressed concrete piles, penetrating into the gray sand layer below the Bay Mud. The design tip elevations were reported as -133 feet (CCSF datum).

The Steuart Place building actually consists of two separate buildings, Steuart Place "North" and Steuart Place "South"; both were renovated in 1982. A new seismic resistant frame has been provided for both buildings. The buildings were built in 1890 and are supported on wood piles.

The North building is six stories high and has a single basement with finished floor slab elevation -10 feet (CCSF datum). The basement extends under the sidewalk approximately 20 feet east of the building line. The South building was originally built as a two story structure. During the recent renovation (upgraded for earthquake resistance), three stories were added.

No new piles were added to strengthen the foundations of either building because the new building design loads are significantly less than the original design loads. There is no information available regarding the size of the piles, their design capacity or depth of penetration.

The Pacific Union Hotel building adjacent to the YMCA was built in 1907 and is a five story brick structure with a single basement. It is supported on wood piles 12 to 16 inches in butt diameter. The eastern portion of the building is presently abandoned, while at the western end, a restaurant operates on the first floor. Visual observations by Dames & Moore indicate that significant differential distress has occurred in this building. It is considered likely that the initial pile foundations did not penetrate through the Bay Mud.

The YMCA building is eight stories high at the east end and two stories high at the west end. It has a single basement and a pile supported sidewalk, with crawl space under the sidewalk. The basement is estimated to be about eight feet below street level. It was constructed in 1926 and 1927. The building is a reinforced concrete structure with the columns supported on substantial pile caps up to 15 feet square. It appears from visual observations by Dames & Moore that this structure is in excellent condition.

The Bayside Plaza building at Embarcadero, Steuart and Howard Streets is eight stories high and has a single basement with finished slab elevation of -10 feet (CCSF datum). It is the newest building on the block and was constructed in 1984. Foundation construction records indicate that 14 inch prestressed concrete piles were driven to elevations -118 feet to -138 feet (CCSF datum). The piles apparently penetrated into the sands and colluvium below the Bay Mud.

Two Bryant and Hills Plaza are south of the portal in both build alternatives and along the surface portion of the alignment; project construction is unlikely to damage these buildings.

LOCATION OF UTILITY LINES

The project area is traversed by many subsurface utilities. The utilities are generally located within the paved area of public street rights-of-way. They include facilities which are publicly owned and private utility companies. A complete description of utility lines in the project area can be found in the Final Engineering Report (Reference No. 1).

Storm sewers and sanitary sewers in San Francisco are usually combined. Within the project area, a box sewer, ranging in size from 15 feet to 17.5 feet, extends from a diversion structure at the intersection of Howard and Steuart Streets southerly along the west side of Steuart to the vicinity of Harrison Street before following The Embarcadero to the south. A 36 inch sewer force main runs along The Embarcadero and turns west into Howard Street. An eight inch sewer line runs along the west curb of The Embarcadero in front of the YMCA building.

Water facilities include a 12 inch high pressure line along Mission Street to the west side of The Embarcadero. A service loop of 10 inch to 12 inch lines is located in Howard, Embarcadero, Folsom and Steuart Streets. Harrison Street contains 8 and 12 inch lines that run westerly to The Embarcadero, and Bryant contains an 8 inch line to The Embarcadero.

Major telephone facilities are located parallel to the curb line in front of the YMCA building on The Embarcadero, branching to the west at Howard Street. Three large vaults, providing transcontinental service via a crossing beneath the Bay, are located beneath the Embarcadero Freeway structure in the vicinity of Howard Street and include three duct banks with 16, 12 and 14 ducts. Mission Street has two telephone duct banks that extend to The Embarcadero. Five telephone manholes and conduits are located along the west side of Steuart extending to its intersection with Folsom Street. Harrison Street contains four ducts that extend to The Embarcadero.

Gas facilities include an eight inch line in the west side of The Embarcadero that extends from north of Mission to Folsom Street. A four inch line in Harrison Street extends to The Embarcadero and runs southerly to Bryant Street.

Several abandoned electric power lines are in Howard Street. An electric manhole is located in the intersection of Howard and The Embarcadero and three electric duct banks are located in The Embarcadero along the west side. Additionally, an electric line and manhole are located in Steuart Street.

Fire alarms, traffic signals and street lights are located throughout the area. Each of these has associated with it conduit and cable for electric power and pull boxes.

MARKET STREET - ROADWAY AND STREET FACILITIES

Market Street has two lanes of traffic in each direction. The roadway is 50 feet wide and the total right-of-way between building lines is 120 feet. Indented parking areas for delivery vehicles have been incorporated into the street design. Market Street intersects with Spear Street and Steuart Street in the project area and with Beale Street, Fremont Street, Drumm Street, California Street, Davis Street, Pine Street and Front Street in the vicinity of the project area. Market Street is paved with concrete pavement and has curbs and brick covered sidewalks and pedestrian crossings as designed in the Market Street Beautification Plan of 1968. On the sidewalks are located "Path of Gold" light standards and an abundance of tree plantings. Overhead wire for MUNI trolley buses traveling along Market Street is strung from the light standards.

Between Beale Street and Spear Street, the Embarcadero Station is used for passengers of both MUNI Metro and BART and accessed by stairs and escalators from the sidewalks. At the intersection of Drumm and California Streets at Market Street, and in front of the Hyatt Regency, is the starting point of the California Street cable car equipped with ticket station and car turntable. Justin Herman Plaza is located at the end of Market Street. Beyond the Plaza, the Ferry Building terminates at the waterfront.

3.10 WATER RESOURCES

3.10.1 SURFACE WATER RESOURCES/RUNOFF AND WATER QUALITY

DRAINAGE AND RUNOFF

Drainage in the downtown portion of San Francisco including the project site is heavily influenced by the existing urban development and infrastructure. The project site is almost entirely covered by impervious surfaces (roads, sidewalks, or structures) and is situated on relatively level terrain. A small portion of the project site comprising Justin Herman Plaza is landscaped and, therefore, pervious to rainfall. Much of the rainfall striking the landscaped portions of Justin Herman Plaza infiltrates into the soil. Most runoff from the remainder of the project site travels by overland flow along sidewalks, street curbs and gutters into the San Francisco combined storm/sewer system. San Francisco's sewer wastewater and storm water runoff drain into the same collection system. This has caused high peak flows to the treatment plants during the rainy season and subsequent overflows of raw sewage into San Francisco Bay and into the ocean. In order to correct this situation, the City is implementing the San Francisco Wastewater Management Plan. Under the wastewater plan, the system is designed to handle peak wet weather flows, the majority of which is storm water runoff. A large box sewer exists below The Embarcadero. The box sewer temporarily stores all storm sewer and sanitary sewer discharge backed up from the treatment plant, which occurs mainly during peak wet weather flows. This container accommodates the overflow of raw sewage and storm runoff which, in the past, was discharged untreated into the bay. All runoff from the project site and areas to the west drains into the box sewer where it is either stored or immediately conveyed to the treatment plant, depending on wet or dry weather flows at the time.

SURFACE WATER QUALITY

The integrity of San Francisco Bay waters is largely dependent upon substances contained in urban runoff, storm water systems, agricultural drainage and accidental spills as well as municipal and industrial waste discharges. Specific water quality data are not available for surface waters of the project site. The surface waters of the project site probably have varying amounts of naturally occurring and human generated pollutants. Natural pollutants include sediments, organic materials, and nitrates. While these pollutants are found as naturally occurring components of stream waters, the development of an urban environment can result in highly elevated levels of these and other contaminants. Many of the pollutants associated with an urban environment are a result of vehicular activity and include lead, zinc, copper, hydrocarbons, and petroleum products.

3.10.2 GROUNDWATER RESOURCES

In the project area, groundwater levels fluctuate slightly with tidal changes. These fluctuations become more pronounced near the seawall and where rubble fill is relatively permeable. Depth to groundwater at the project site ranges from nine to eleven feet. Because much of the project area is impermeable, the area is not considered an important recharge area. Much of the existing groundwater has been intruded by seawater, rendering the supply brackish and unpalatable.

As will be discussed in greater detail in Section 3.12, Hazardous Materials, the results of a preliminary assessment of past and present potential hazardous waste sources in and adjacent to the project area indicate that there are a limited number of suspect "on site" and "off site" land uses with potential for causing groundwater contamination (Dames and Moore, Geotechnical Report, 1988). Contacts with local agencies indicate that there are no active cleanup sites for toxics or fuel leaks in the vicinity of the project site, nor are there any current industrial discharges into sewers adjacent to the proposed excavations. However, there are seven locations within 100 feet of the project site where contamination of soil or groundwater from leaking underground petroleum storage tanks is known or suspected. Refer to Section 3.12 for the locations of these sites. The presence of such hazardous materials in groundwater if they exist at the project site should be detected in the Hazardous Waste Analyses required by the Maher Ordinance (#443-86).

3.10.3 FLOODPLAINS/WETLANDS

FLOODING

Much of the area of downtown San Francisco, including the project site, has not been mapped by the Federal Emergency Management Agency (FEMA), nor are they expected to be in the future due to extensive land alterations that have occurred in the area. Natural drainage channels and floodplains do not exist in the project area. Some localized ponding of rainwater occurs along street curbs and other low lying areas following heavy rainfall.

The project site is located within the 200 year tsunami inundation zone. Tsunamis are water waves that are caused by sudden vertical movements of a large area of the sea floor during an earthquake. A tsunami of this magnitude has the probability of occurring once in 200 years. The project site would be inundated by approximately six feet of runup water from a 200 year tsunami event.

WETLANDS

The entirety of the project site has been altered through either landscaping or urban development. Therefore, no wetlands occur on the project site.

3.11 BIOLOGY

EXISTING SETTING

The biological features of the project sites are limited due to the urbanized character of the project area. Landscaping provides some habitat for birds adapted to urban development. Small rodents, most of which are considered pests, also inhabit buildings, yards and drainageways along with cats and dogs.

3.11.1 TERRESTRIAL VEGETATION

Trees and shrubs found on the study site are those commonly used in urban landscaping, such as eucalyptus trees (*Eucalyptus* spp.), London Plane trees (*Platanus acerifolia*), pines (*Pinus* sp.), willows (*Salix* sp.), and plum trees (*Prunus* sp.). These trees generally line the streets between the sidewalk and the curb. Throughout the study site, English ivy (*Hedera helix*) is extensively used both as a groundcover beneath the street trees and as a climbing vine on freeway off-ramps support pillars.

Market Street between Spear and Steuart Streets has a double row of London Plane trees every 20 to 30 feet. The southwest side of Justin Herman Plaza, bordered by Steuart and Market Streets, is lined with approximately 20 London Plane trees. Fifteen street trees separate the Hyatt Regency from the park. Other areas of the park are landscaped with pine, willow, Lombardy poplar, eucalyptus, cherry (*Prunus emarginata*) and purpleleaf plum (*Prunus cerasifera*), as well as seasonal flower plantings.

3.11.2 TERRESTRIAL WILDLIFE

The majority of birds inhabiting the project area would be those adapted to urban conditions such as mourning doves, starlings, house sparrows, finches, robins, hummingbirds, and gulls. Common rodents would be Norway rat, black rat, house mouse, western gray squirrel and fox squirrel.

3.11.3 MARINE VEGETATION

The edge of the bay extends below the piers, parking lots, and buildings that currently line the bay within the study site. If any marine vegetation is present at the study site, it would be located on the bottom of the bay. Constant turbidity of the bay restricted a field survey of any existing marine vegetation. Turbidity would also, however, limit growth of such vegetation.

3.11.4 MARINE WILDLIFE

Marine animals present could not be estimated due to the turbid condition of the bay; however, marine animals are not expected to be common in close vicinity of such a developed shore.

3.11.5 RARE, THREATENED AND ENDANGERED SPECIES

No rare or endangered species have been identified within the study site (Sorenson, 1988), nor are any expected due to the site's urban condition.

3.12 HAZARDOUS MATERIALS

Definitive studies concerning the presence of hazardous materials will be completed as part of the Phase II (Final Design) studies for the project. To date, the results of a preliminary assessment of past and present potential hazardous waste sources in and adjacent to the Turnaround Project area indicate that there are a limited number of suspect "on site" land uses with potential for causing soil or groundwater contamination (Dames & Moore, 1988a). The locations of these sites and the suspected contaminants are tabulated below:

Location	Past Usage	Present Usage	Potential Contaminant
1. Block bounded by Market, Mission, Steuart and Embarcadero	Lumber Yard	MUNI Bus Turnaround and Justin Herman Plaza	Arsenic and lead, oil, grease, fuel
2. Block bounded by Howard, Folsom, Steuart and Embarcadero	Lumber Yard		Arsenic and lead
	Coal Yard		Copper, zinc and aromatic compounds
	Paint Shop		Volatile organic compounds
	Electric Equipment Manufacturing	Parking Facility	Grease, solvents
		Abandoned Woodframe Structure	
	Machine Shop	Marine Terminals Corporation	Oil and grease
	Auto and Truck Depot	Electric Equipment Manufacturing	Oil, grease, fuels, solvents
	Lawn Mower Repair Shop		Oil, grease, solvents
	2 Underground Storage Tanks Removed in February and September 1987		Petroleum hydrocarbons
3. The Embarcadero Market Street to Folsom Street		Belt Railroad	Oil, grease, fuel, polynuclear aromatic hydrocarbons (PNAs), lead, arsenic, cyanide

Other potential "off site" sources of potential contamination are shown in Table 3.12-1. "On site" land uses are those occupying the area in which excavations will be performed for the Turnaround Project. "Off site" land uses are those within 100 feet of the "on site" areas. The 100 foot zone was selected for study of potential hazardous waste contamination sources in accordance with the requirements of the CCSF Ordinance No. 443-86 "Analyzing Soil for Hazardous Wastes," also known as the Maher Ordinance.

3.12.1 HISTORICAL, ARCHIVAL AND AGENCY RECORDS

The primary sources of information for hazardous waste studies regarding historical land uses were Sanborn Insurance Company Maps of 1886/87, 1899, 1913, 1929, 1948, 1950, 1965 and 1987 and the 1977 Olmsted & Olmsted San Francisco Waterfront report. Other sources included discussions with property owners, City and County of San Francisco files, the Port of San Francisco, and others. Contemporary land uses were investigated by conducting a site visit and discussions with owners and operators of businesses within the study area. A complete list of references in included in the Reference Section of this EIS.

Contacts with local government agencies (San Francisco Bay Regional Water Quality Control Board, California Department of Health Services in Emeryville and the City and County of San Francisco Department of Public Works) indicate that there are no active cleanup sites for toxics or fuel leaks in the vicinity of the proposed MUNI Turnaround Project nor are there any current industrial discharges into sewers adjacent to the proposed excavations.

There are seven locations within 100 feet of the proposed Surface or Underground Alternative alignments where contamination of soil or groundwater from leaking underground petroleum storage tanks is known or suspect. The current status of activities concerning these tank sites is shown in Table 3.12-1; locations are shown in Figure 3.12-1.

3.12.2 ABATEMENT AND REMEDIAL ACTION SITES

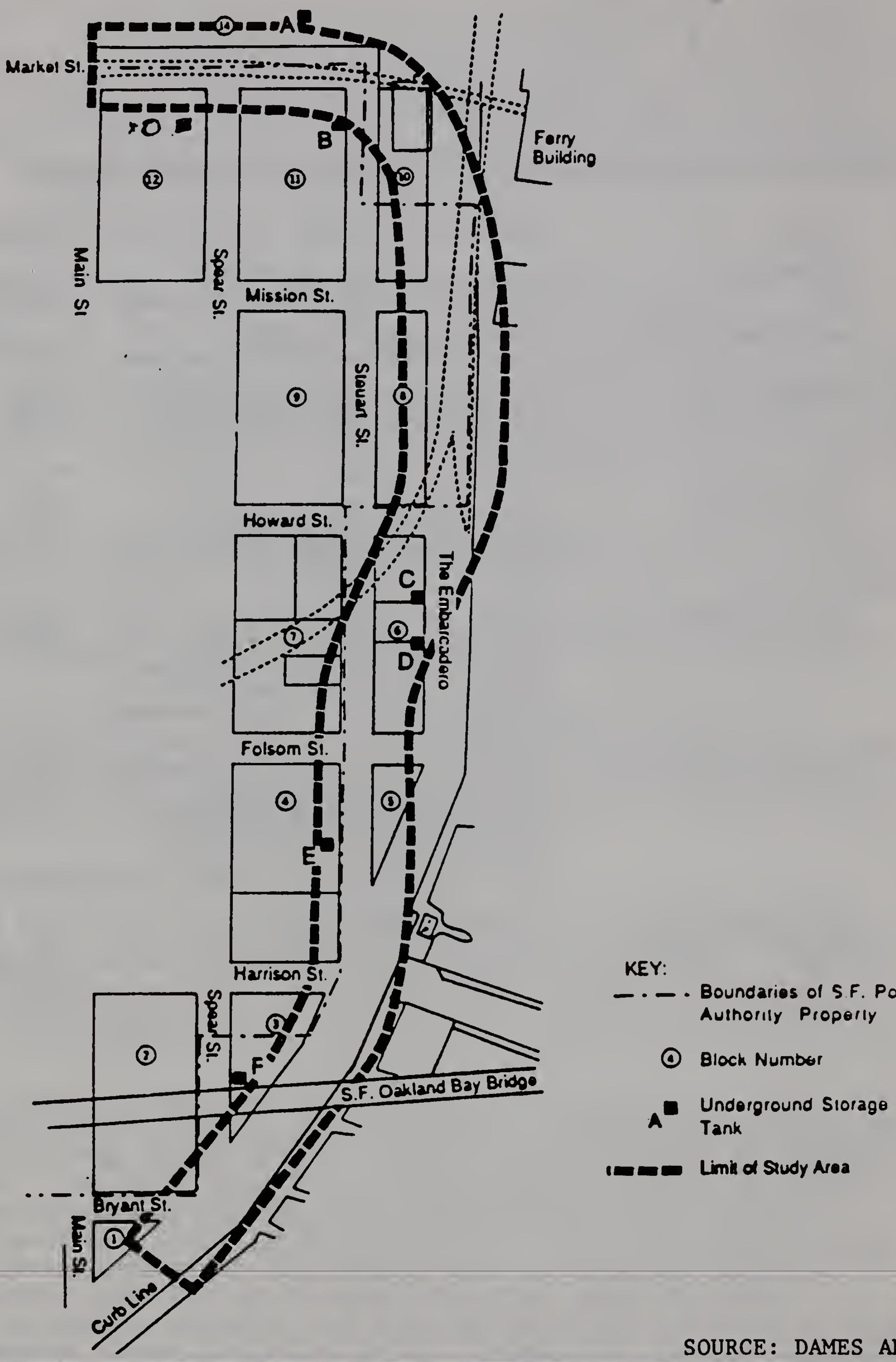
Other than the Underground Storage Tank sites listed in Table 3.12-1, there are no known abatement and remedial action sites in the vicinity of the proposed Turnaround Facilities (California Regional Water Quality Control Board, San Francisco Bay Region, 1988; Sunga, M., California Department of Health Services, 1988).

The most significant hazardous waste cleanup in Yerba Buena Cove within the recent past (1985) has been at the 301 Howard Building site (southwest corner of Howard and Beale Streets about 1,500 feet westerly of the proposed MUNI Turnaround). During the excavation for the building basements, hazardous substances were encountered near the fill/Bay Mud interface which are allegedly associated with residue dumped into the bay in the late 1800s from a Pacific Lighting Company gas illuminating plant operating at First and Fremont Streets (reference San Francisco Chronicle, April 28, 1986). Available information indicates that these gas plant residues would not have been transported either in fills or by bay currents into the MUNI Turnaround Project area. Evidence supporting this opinion includes the fact that recent building excavations for the Bay Side Plaza Building at Howard Street and The Embarcadero and the Rincon Annex at Howard between Steuart and Main Streets did not encounter any suspect hazardous wastes that required special treatment of the excavated soil or the groundwater. The presence of such hazardous materials, if they exist at the Turnaround Project site, should be detected in the Hazardous Waste Analyses required by the Maher Ordinance.

Table 3.12-1

Leaking Underground Petroleum Storage Tanks Being Monitored or Previously Removed

Location	Address	Status	Reference
O.	101 Market St.	Underground storage tank (UST) currently being monitored for fuel leaks.	M. Sunga (1988)
A.	5 Embarcadero Center	Underground storage tank (UST) currently being monitored for fuel leaks.	J. Carroll (1988)
B.	1 Market Plaza	Concrete-encapsulated UST removed, no soil testing was required by the San Francisco Department of Public Health (9/10/87).	CCSF, DPH (1988)
C.	240 Embarcadero	Fuel UST removed and soil tested in September 1987. Testing indicated petroleum hydrocarbon contamination of 9746 ppm. Contaminated soil left in place.	CCSF, DPH (1988)
D.	260 Embarcadero	Unleaded gas UST removed and soil tested in February 1987. Testing indicated Total Petroleum Hydrocarbons = 1800 ppm, benzene = 85 ppm, toluene = 360 ppm, xylene = 63 ppm. Contaminated soil was left in place.	CCSF, DPH (1988)
E.	242 Steuart Street	Gasoline UST removed and soil tested in June 1986. Tests indicated Total Petroleum Hydrocarbons = 13-45 ppm, Total Diesel Hydrocarbons = 25-50 ppm. These results are below the present regulatory action levels.	CCSF, DPH (1988)
F.	Spear Street between Harrison and Bryant Streets	UST removed and soil tested. No significant contamination found	Port of San Francisco (1988)


A
14
Market St.
Ferry Building
B
12
11
10
Main St
Spear St.
Mission St.
Steuart St.
9
8
Howard St.
The Embarcadero
C
7
6
D
Folsom St.
4
3
E
Harrison St.
2
Spear St.
3
F
S.F. Oakland Bay Bridge
Bryant St.
1
Main St.
Curb Line
KEY:
Boundaries of S.F. Port Authority Property
Block Number
A Underground Storage Tank
Limit of Study Area

SOURCE: DAMES AND MOORE

N
SCALE

FIGURE 3.12-1 LOCATIONS OF REMOVED OR MONITORED UNDERGROUND STORAGE TANKS WITHIN 100' OF PROPOSED EXCAVATION

3.13 HISTORIC AND CULTURAL RESOURCES (SECTION 106)

3.13.1 INTRODUCTION

This chapter discusses legal and regulatory requirements pertaining to historic and cultural resources. The point to which this FEIS takes the process in compliance with Section 106 of the National Historic Preservation Act is discussed and an inventory of cultural resources in the project area is presented.

3.13.2 APPLICABLE LEGAL AND REGULATORY REQUIREMENTS

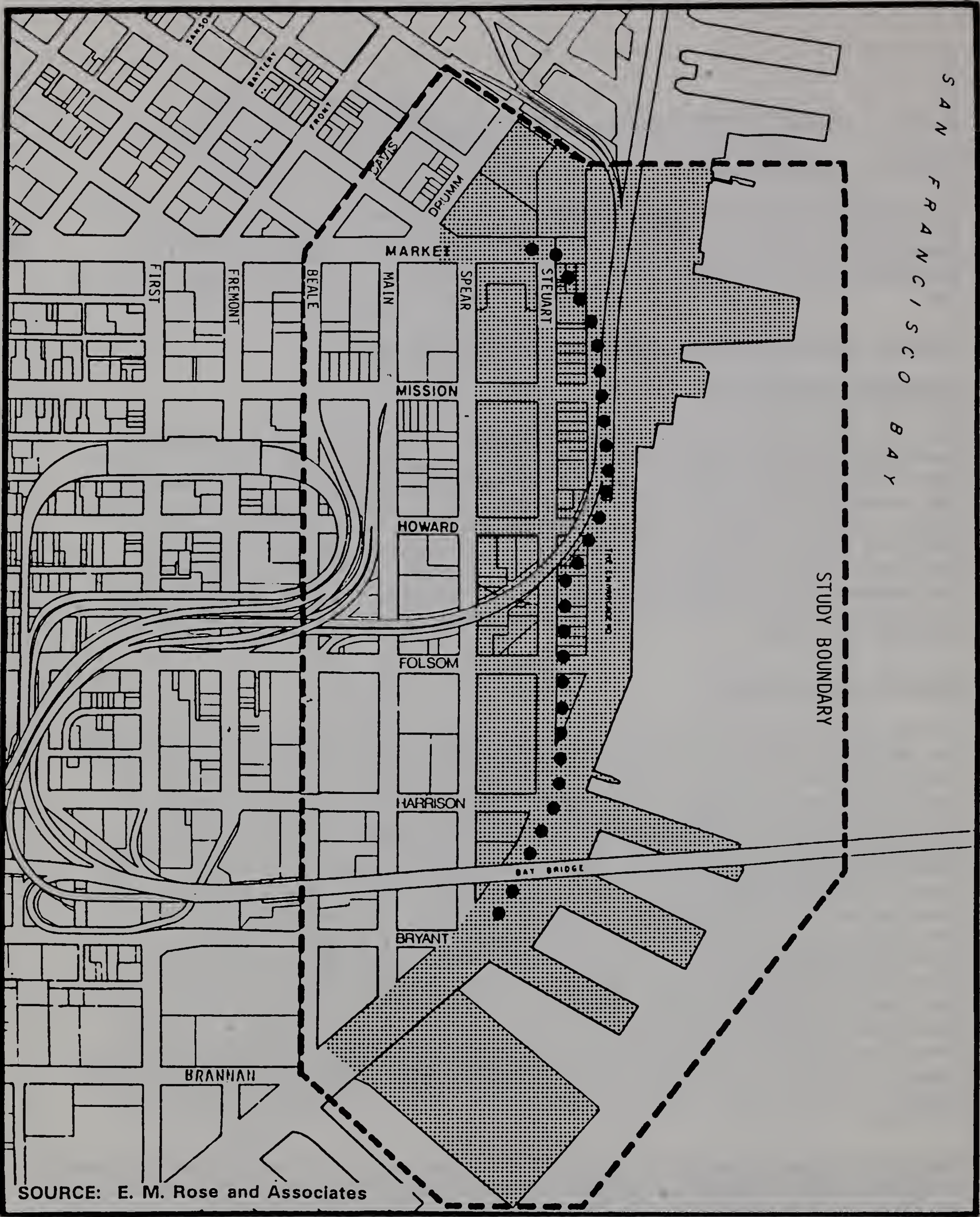
REGULATORY REQUIREMENTS

Section 106 of the National Historic Preservation Act of 1966, as amended, and Executive Order 11593 "Protection and Enhancement of the Cultural Environment" requires that impacts of Federally-assisted projects be examined for all historic districts, sites, buildings, structures, or objects, and archaeological sites listed or eligible for inclusion in the National Register of Historic Places. The Act also requires that Federal agencies afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on undertakings that affect such properties. The ACHP has established procedures for the "Protection of Historic and Cultural Properties" (36 CFR, part 800).

SECTION 106 COMPLIANCE

In the preparation of this FEIS, the following activities have been performed in compliance with Section 106. At the request of the California State Historical Preservation Office (SHPO), a literature research for the historic and archaeological resources in and around the project area has been prepared (see San Francisco Municipal Railway Metro Turnaround Project Historical and Cultural Research to 1887 (Reference Document 10). SHPO also requested that MUNI files from the 1978-1980 period on this project be reviewed. The files were reviewed and the results presented to SHPO. The findings reflected that request for historic surveys and archaeological investigations from the earlier period of the project have since been addressed. The most recent investigations occurred as a part of the I-280 Transfer Study and the San Francisco Department of City Planning's detailed evaluation of historic buildings for the Downtown Plan. The inventory data from the I-280 and Downtown Plan EIRs are therefore utilized, as appropriate, for this project due to the recent nature of these studies and the corresponding areas of environmental impact. The Area of Potential Environmental Impact (APEI) for the Turnaround Project has been established in coordination with SHPO and UMTA (see Figure 3.13-1).

The historic and potential archaeological resources in and around the Turnaround Project area are identified in this section. See Table 3.13-1, Historic Buildings and Elements in the MUNI Metro Turnaround Area of Potential Environmental Impact, for the status of each resource. Table 3.13-1 is based upon a compilation of primary historical resource inventories of the project area. Each column reports the evaluation of the historic resource specified under


SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
HOWARD
THE EMBARCADERO
FOLSOM
HARRISON
BAY BRIDGE
BRYANT
BRANNAN
SAN FRANCISCO BAY
STUDY BOUNDARY

SOURCE: E. M. Rose and Associates

FIGURE 3.13-1 PROJECT STUDY AREA

● ● ● PROJECT LOCATION (BUILD ALTERNATIVES)

▒ POTENTIAL ENVIRONMENTAL IMPACT AREA

▬ ▬ ▬ STUDY AREA

800 FEET

TABLE 3.13-1. HISTORIC BUILDINGS AND ELEMENTS IN MUNI METRO TURNAROUND AREA OF POTENTIAL ENVIRONMENTAL IMPACT

	1	2	3	4	5
FACILITY	HERITAGE ARCHITECTURAL INVENTORY	SAN FRANCISCO LANDMARKS ADVISORY BOARD ACTION	DOWNTOWN PLAN	HERITAGE DOWNTOWN INVENTORY PHASE II	I-280 HISTORIC PROPERTIES SURVEY
Union Ferry Depot, Market/ The Embar.	A-Highest Importance	City Landmark 7/9/77	Not Rated	Not Surveyed	National Register 12/1/78
S.P. Building 1 Market	A-Highest Importance	None	Category I Retain	Not Surveyed	Potentially Eligible
Agriculture Bldg., Mission/ The Embar.	A-Highest Importance	None	Not Rated	Not Surveyed	National Register 12/1/78
Rincon Annex 99 Mission/ Spear	DCP-3	City Landmark 2/10/80	Not Rated	Not Surveyed	National Register 11/16/79
Audiffred Bldg., 1 Mission	DCP-3	City Landmark 4/11/68	Category I Retain	Not Surveyed	National Register 5/10/79
110-116 The Embar.	Not Surveyed	None	Not Rated	C-Contextual Importance	
East St. Imp. Co., 128-132 The Embar.	Not Surveyed	None	Not Rated	C-Contextual Importance	Potentially Eligible
Hihn/Meyer Bldg., 137-143 Steuart	Not Surveyed	None	Not Rated	C-Contextual Importance	Potentially Eligible
Embarcadero Inn, 144-146 The Embar.	Not Surveyed	None	Not Rated	C*-Contextual Importance	Potentially Eligible
Embarcadero YMCA, 166 The Embar.	DCP-1	None	Category I Retain	A-Highest Importance	Determined to be Eligible (2-26-82)

(CONTINUED)

TABLE 3.13-1 (CONTINUED). HISTORIC BUILDINGS AND ELEMENTS IN MUNI METRO TURNAROUND AREA OF POTENTIAL ENVIRONMENTAL IMPACT

FACILITY	1 HERITAGE ARCHITECTURAL INVENTORY	2 SAN FRANCISCO LANDMARKS ADVISORY BOARD ACTION	3 DOWNTOWN PLAN	4 HERITAGE DOWNTOWN INVENTORY PHASE II	5 I-280 HISTORIC PROPERTIES SURVEY
Seaman's Inst. 240-242 Steuart	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Hills Coffee 2 Harrison	DCP-4	City Landmark 11/7/82	Not Surveyed	Not Surveyed	National Register 10/16/81
Pier 22-1/2 Fireboat House	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Pier 24 Bulkhead	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Pier 26 Bulkhead	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
Pier 28 Bulkhead	Not Surveyed	None	Not Surveyed	C*-Contextual Importance	Potentially Eligible
San Francisco-Oakland Bay Bridge	Not Rated	None	Not Surveyed	Not Surveyed	Potentially Eligible
Cable Car System, Calif./ Market	Not Rated	None	Not Rated	Not Surveyed	National Register 10/15/66
Belt Line RR Right-of-Way	Not Surveyed	None	Not Surveyed	Not Surveyed	Potentially Eligible
New Seawall	Not Surveyed	None	Not Surveyed	Not Surveyed	Determined to be Eligible (11-3-78)

SOURCES

Column 1 San Francisco Foundation for Architectural Heritage C-3 Survey, Phase I.

TABLE 3.13-1 (CONTINUED). HISTORIC BUILDINGS AND ELEMENTS IN MUNI METRO TURNAROUND AREA OF POTENTIAL ENVIRONMENTAL IMPACT

Splendid Survivors, San Francisco Foundation for Architectural Heritage, California Living Books, 1979.

DCP Rating: 1976 Architectural Inventory, Department of City Planning. A visual and urban design inventory of design quality. Ranking system from 0 - contextual significance - to 5 - lowest to highest significance.

Column 2 San Francisco Landmarks Advisory Board, phone conversation with Johnathan H. Malone, 27 May 1986.

Column 3 San Francisco Downtown Plan, 1986. A Comprehensive Plan Element; Ordinance #414-85 amending the Planning Code of the City and County of San Francisco. Appendix C, updated by phone conversation with Larry Badner, 28 May 1986.

Column 4 San Francisco Foundation for Architectural Heritage, C-3 District Inventory Phase II, Chris Nelson phone conversation, 27 May 1986. Uses rating system from Phase I, explained in Splendid Survivors.

C rating can be increased if alterations removed or if architect is discovered. Asterisk (*) indicates added significance.

Column 5 California Transportation Department, San Francisco, 1983, I-280 Transfer Concept Program Historic Properties Survey Report and the San Francisco Landmarks Advisory Board; phone conversation update, May 27, 1988.

the facility column. No primary field surveys were undertaken for this historic building research.

For example, the Seaman's Institute classification as potentially eligible for the National Register of Historic Places is taken from the "I-280 Transfer Concept Program Historic Properties Survey Report". The San Francisco Heritage Downtown Inventory, Phase II, also surveyed the Seaman's Institute. The Belt Line Railway right of way was also classified as potentially eligible for the National Register by the "I-280 Transfer Concept Program Historic Properties Survey Report". The Belt Line was later determined to be eligible as a result of the I-280 Survey. The Turnaround FEIS reference to these properties is based on this secondary data.

The significance of these resources is also discussed in this section. Potential impacts and possible mitigation measures to protect historic resources are presented in Chapter 4.13. In further preparation of the DEIS, the Northwest Regional Archaeological Survey was also consulted to research possible archaeological resources in the project area. San Francisco Municipal Railway Metro Turnaround Project Historical and Cultural Research to 1887 reports the result of this research.

3.13.3 HISTORIC RESOURCES POTENTIALLY AFFECTED

The historic/architectural buildings discussed below are in the immediate APEI (see Figure 3.13-1). A summary of the historic resources within the APEI is presented in Table 3.13-1. The location of these resources is illustrated by Figure 3.13-2. A comprehensive listing of historic resources in the general study area is presented in Reference Document No. 5.

FERRY BUILDING, UNION FERRY DEPOT, FOOT OF MARKET AT THE EMBARCADERO

Constructed between 1894 and 1898, the Ferry Building served as San Francisco's ferry terminal and housed Port and State offices. Its designer, A. Page Brown, was one of the city's most important pre-fire architects. The Ferry Building survived the 1906 conflagration and was remodeled after ferry service ended in 1958.

SOUTHERN PACIFIC BUILDING, 1 MARKET STREET

The Southern Pacific Building was one of the earliest corporate headquarters buildings in San Francisco. Designed by Bliss and Faville and built in 1916, the ten-story structure is architecturally significant for its fine use of brick and terra cotta, and for its Renaissance/Baroque detailing.

AGRICULTURE BUILDING/FERRY STATION POST OFFICE, FOOT OF MISSION AT THE EMBARCADERO

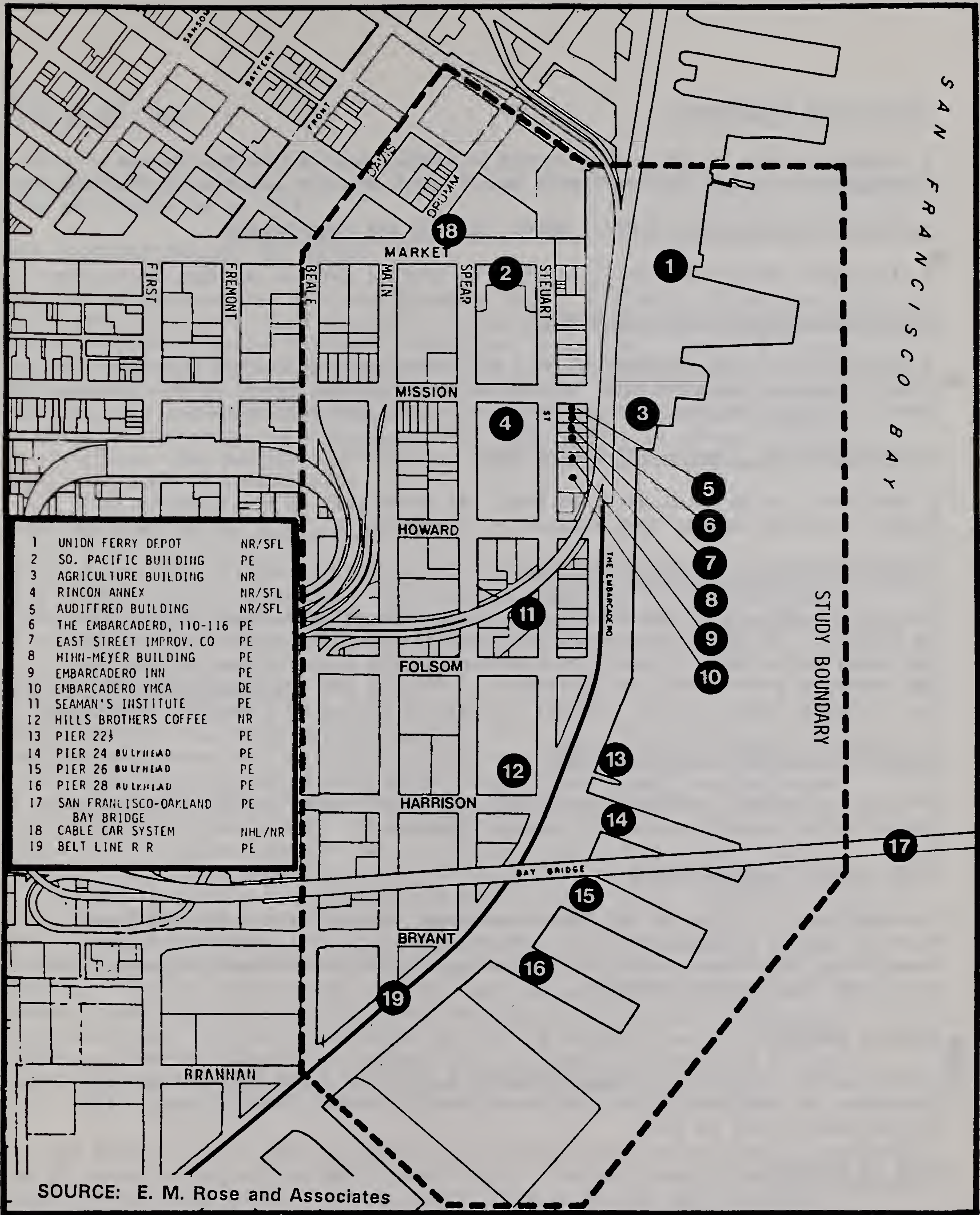
Built as a U.S. Post Office in 1914-15 and transferred to the U.S. Department of Agriculture about 1930. Designed by A. A. Pyle of the State Department of Engineering, the building is a modified palazzo with Renaissance ornamentation of Mediterranean style.

RINCON ANNEX, 99 MISSION AT SPEAR

Designed by Gilbert Stanley Underwood and built in 1940, the Rincon Annex is a superb example of Work Progress Administration Moderne style of architecture. The interior features murals depicting scenes from California history. The building is currently the centerpiece of the Rincon Point-South Beach Redevelopment Project and has been renovated to provide retail and commercial space.

AUDIFFRED BUILDING, 1-21 MISSION

The four-story Audiffred Building, constructed in 1889, is the only remaining structure on the landward side of The Embarcadero that survived the 1906 earthquake and fire. Featuring a distinguished mansard roof and decorative brickwork, the Audiffred Building is one of the anchor buildings of the historic East Street Row.


SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
BEALE
MAIN
SPEAR
STEUART
MISSION
ST
HOWARD
THE EMBARCADERO
FOLSOM
HARRISON
BAY BRIDGE
BRYANT
BRANNAN
SAN FRANCISCO BAY
STUDY BOUNDARY
1
2
3
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1	UNION FERRY DEPOT	NR/SFL
2	SO. PACIFIC BUILDING	PE
3	AGRICULTURE BUILDING	NR
4	RINCON ANNEX	NR/SFL
5	AUDIFFRED BUILDING	NR/SFL
6	THE EMBARCADERO, 110-116	PE
7	EAST STREET IMPROV. CO	PE
8	HIHN-MEYER BUILDING	PE
9	EMBARCADERO INN	PE
10	EMBARCADERO YMCA	DE
11	SEAMAN'S INSTITUTE	PE
12	HILLS BROTHERS COFFEE	NR
13	PIER 22½	PE
14	PIER 24 BULKHEAD	PE
15	PIER 26 BULKHEAD	PE
16	PIER 28 BULKHEAD	PE
17	SAN FRANCISCO-OAKLAND BAY BRIDGE	PE
18	CABLE CAR SYSTEM	NHL/NR
19	BELT LINE R R	PE

SOURCE: E. M. Rose and Associates

FIGURE 3.13-2 HISTORIC RESOURCES

NHL	NATIONAL HISTORIC LANDMARK
NR	LISTED ON NATIONAL REGISTER
DE	DETERMINED ELIGIBLE FOR NATIONAL REGISTER
SFL	CITY AND COUNTY OF SAN FRANCISCO LANDMARK
PE	POTENTIALLY ELIGIBLE FOR NATIONAL REGISTER

800 FEET

110-116 THE EMBARCADERO

A two-story brick building constructed in 1913. Part of the East Street Historic Row located between Howard and Mission, Steuart and The Embarcadero.

EAST STREET IMPROVEMENT COMPANY HOTEL, 128-132 THE EMBARCADERO

A five-story brick hotel built in 1907, it forms a part of the East Street Row.

HIHN/MEYER BUILDING, 137-143 STEUART

A two-story building designed by Ward & Bloehme and constructed in 1910. Used originally for commercial activities on the ground level and for residences above, the building has been renovated for retail and office uses.

EMBARCADERO INN, 144-146 THE EMBARCADERO

A four-story brick hotel built in 1906. It forms part of the historic East Street Row that extends from Mission to Howard.

EMBARCADERO YMCA, 166 THE EMBARCADERO

This eight-story brick building was designed by Carl Warner and constructed in 1925-26. The decorative detailing is in the Renaissance Revival style. The Embarcadero YMCA, a significant element in the historic East Street Row, has received grants from the Department of Housing and Urban Development for building rehabilitation through the Mayor's Office of Community Development.

SEAMAN'S INSTITUTE, 240-242 STEUART

Designed by Wright, Rushforth and Cahill and constructed in 1907. This Mission Revival style building currently houses offices.

PIER 22-1/2, FIREBOAT HOUSE

Designed by A. A. Pyle of the State Department of Engineering for the State Board of Harbor Commissioners, and constructed circa 1916, the Fire Boat House still functions as a fire station servicing Port of San Francisco facilities with the Fireboat Phoenix.

PIER 24 BULKHEAD

A Mission Revival style bulkhead designed in 1914 by A. A. Pyle of the State Department of Engineering for the State Board of Harbor Commissioners. Pier 24 was constructed in 1915.

PIER 26 BULKHEAD

A Mission Revival style bulkhead designed in 1912 by A. V. Saph of the State Department of Engineering for the State Board of Harbor Commissioners and completed in 1913.

PIER 28 BULKHEAD

A Mission Revival style bulkhead designed in 1912 by A. V. Saph of the State Department of Engineering for the State Board of Harbor Commissioners. Construction was completed in 1913.

SAN FRANCISCO-OAKLAND BAY BRIDGE

Constructed between May, 1933 and November, 1936. The major bridge designers were: Henry Purcell, Chief Engineer; Charles E. Andrew, Bridge Engineer; Glen B. Woodruff, Design Engineer; and Arthur Brown, Jr., Timothy Pflueger, and John Donovan, Consulting Architects. The bridge consists of two structures joined by a tunnel through Yerba Buena Island. The west crossing, between San Francisco and Yerba Buena Island, consists of two suspension bridges anchored in the center to a concrete pier. This design is unique in bridge construction. The Oakland side combined two types of truss design with a cantilever span of 1,400 feet.

HILLS BROTHERS COFFEE PLANT, 2 HARRISON

Designed by George Kelham and built in 1926, the Hills Brothers building is a fine example of Romanesque style detailing applied to an industrial building. It still houses an operating coffee business and is the focus of redevelopment efforts in the South Beach area of the waterfront.

THE OLD AND NEW SEAWALLS

The Old Seawall was specified and designed as a part of the official William Eddy Red Line Survey of 1851 which defined the City boundaries. The Red Line Survey formed a series of 90-degree angles from Powell and Jefferson at the north to Jackson Street. From Jackson, the Survey runs a straight line across to Folsom Street. The survey line continues from Folsom and angles to the southern boundary at a line extending from Corbett Street. Clark's Point, the northern boundary of Yerba Buena Cove, and Rincon Point, its southern boundary, are both covered by the survey grid. Therefore, the entire area of Yerba Buena Cove was contained within the survey grid defining San Francisco's boundaries. A government reserve of two submerged blocks between Washington and Jackson, Front and Drumm, is specified in these waterlot blocks. The City sold off the waterlots and leased the streets between the blocks to developers to provide needed shipping facilities for the booming gold rush port. The 90-degree angles of the Old Seawall resulted in heavy shoaling. The Old Seawall (not mapped) has not been evaluated for National Register eligibility by sources utilized in the preparation of Table 3.13-1.

The New Seawall, built between 1887 and the late 1920s, was designed to eliminate the 90-degree angles of the Eddy seawall line. The New Seawall design also permitted the expansion of land facilities of the Port of San Francisco. The New Seawall was constructed in phases. A 1,000-foot segment from Pacific to Clay was completed by May 1889. The first segment to be built south of Market, to the foot of Mission, was completed in June 1890. The section from Folsom to Harrison was finished by May,1915. Substantial amounts of rubble were incorporated into the New Seawall, particularly after the 1906 earthquake and fire. The area between the Old Seawall and the New, together with the East Street right-of-way, is known as The Embarcadero. It was, and remains, the public part of the Port utilized for moving men and materials to and from the ships, piers and warehouses. The New Seawall was completed approximately 75 years following the completion of the Eddy Survey of 1851 and the initiation of work on the Old Seawall.

BELT LINE RAILWAY RIGHT-OF-WAY

The Belt Line was constructed beginning in 1889 to handle cargo to and from San Francisco's growing port and to serve numerous industries along the waterfront. The Belt Line was unusual in that it was a publicly constructed, owned and operated railway. The Belt Line and the seawall were both instrumental to the development of the waterfront. The wide flat area known as The Embarcadero, created by the New Seawall, was naturally suited for the Belt Line railway tracks, with room for access to both warehouses and wharves. By the 1930s the Belt Line included 42 miles of track operated by the Port and eight miles of yard tracks controlled by other railroads. During World War II, use of the railway peaked and trains were operating around the clock. Since the war, use of the Belt Line has declined with the shift to containerized cargoes. The Belt Line was considered a well-planned and well-constructed railway. Its integrity was reduced by the removal, paving over or deterioration of 77 percent of its original tracks. The Belt Line Railway has not functioned since 1985 and has not seen revenue service for eight years, but is still operational.

ACCESS TO HISTORIC SITES

Access to historical resources in the MUNI Metro Turnaround area is open for both motor vehicles and pedestrians. Access to the historic East Street Row block, the area closest to the construction zone, is from both Steuart Street and The Embarcadero fronts. The heaviest pedestrian usage in the project area (6,000 to 8,000 persons per hour during peak periods) occurs between the Ferry Building and the Justin Herman Plaza/Embarcadero Center area. Access between the Hills Brothers Coffee Building and the Hills parking lot located south of Folsom between Steuart and The Embarcadero results in regular pedestrian traffic across Steuart Street.

The current levels of pedestrian usage to and near historic sites in the project area is highest adjacent to blocks with the highest densities of development. The Ferry Building, Southern Pacific Building, Rincon Annex and East Street Row are among the historic properties in the project area with the highest levels of usage. Current develoment associated with the Hills Brothers Building will increase the level of pedestrian usage at this historic site. The Promenande is most actively utilized by workers from the Embarcadero Center/Ferry Building area during lunch and afternoon. The intense activity along the Promenade results in a high level of pedestrian usage in front of the Ferry Building, the Agriculture Building, and the historic bulkheads in the project area.

ARCHAEOLOGICAL RESOURCES

The 1977 report on preconstruction testing for the San Francisco Wastewater Program reports the results of boring tests along Steuart Street and in the Embarcadero areas south of Market. For the Steuart Street test borings, the greatest concentration of artifacts was found on Steuart Street between Howard and Harrison. These borings revealed "the greatest concentration of artifactual materials (as well as the oldest specimens)" of the entire South of Market Embarcadero area. Four hundred and seven artifacts were recovered in one auger hole at this location. These materials were located between 2 to 3 and 17 to 18 foot levels. In the Embarcadero area of the 1977 preconstruction testing program (between First and Spear) the corner of The Embarcadero and Main contained the densest concentration of artifacts. At this site the artifactual materials were found as deep as 26 to 27 feet below the surface. Borings taken at the intersection of The Embarcadero and Steuart Street, however, yielded only a small amount of materials (Pastron, 1977; 21-6; 84-132)

STORESHIPS IN SAN FRANCISCO

Gold rush era businessmen often purchased old or abandoned ship structures and converted them into warehouses, stores, hotels, saloons, or restaurants by moving them to a lot or by leasing space at a pier or wharf. Presumably waterlots were the most convenient places to locate one's newly acquired storeship. This was done because building was prohibitively expensive during the gold rush years. Maritime Library research conducted by Marmon, Soeten and Kortum indicates that there were at least 164 storeships in San Francisco in July of 1852. An early observer found that:

> These ships had a very old, ruinous antiquated appearance, and at first sight, give me an impression that this new born city had been inhabited for ages and was now going to ruin. (Maritime Library manuscript)

Most of the storeships were berthed north of Market because that portion of Yerba Buena Cove developed earlier than the South of Market blocks. However, as the Maritime Library listing included here indicates, according to newspaper accounts of the period, there were storeships in the South of Market area as well. The Roma and the Othello are the most likely to be located in the project APEI area. Table 3.13-2 lists the possible storeships and Figure 3.13-3 indicates the suspected location of these storeships. The status of storeships or other archaeological resources which could potentially be encountered during construction would be determined during the archaeological recovery and monitoring program as discussed in Section 4.13 and in the project Memorandum of Agreement (see Appendix F).

TABLE 3.13-2. GOLD RUSH ERA STORESHIPS IN TURNAROUND STUDY AREA, NORTH AND SOUTH OF MARKET

This list was developed from 19th century newspaper accounts by Maritime Library researchers. All the ships indicated were business storeships except for the Panama which was utilized as a chapel. The Roma and the Othello are most likely to be found during construction activities.

Panama. Facing Davis Street. Davis, Drumm, Washington, Clay. Historical records indicate sure final disposition. Other records indicate the ship hull was absorbed into the Mission Street Wharf.

Elizabeth. Angled with the Clay Street Wharf off of the surveyed grid pattern. Drumm, Embarcadero, Washington, Clay. Historical records sure of this disposition.

Henry Lee. Ship bow facing California Street. Davis, Drumm, California, Sacramento. Historical sources unsure of final disposition.

Autumn. Facing the angle of Market on block between Davis, Drumm, California, Market. Unsure of final disposition.

Callao. Pointing up Pine Street at intersection of Market, Davis and Beale Streets. Sure of final disposition.

Bryon. Center of Market Street at intersection of Market, Davis and Beale Streets. Sure of final disposition.

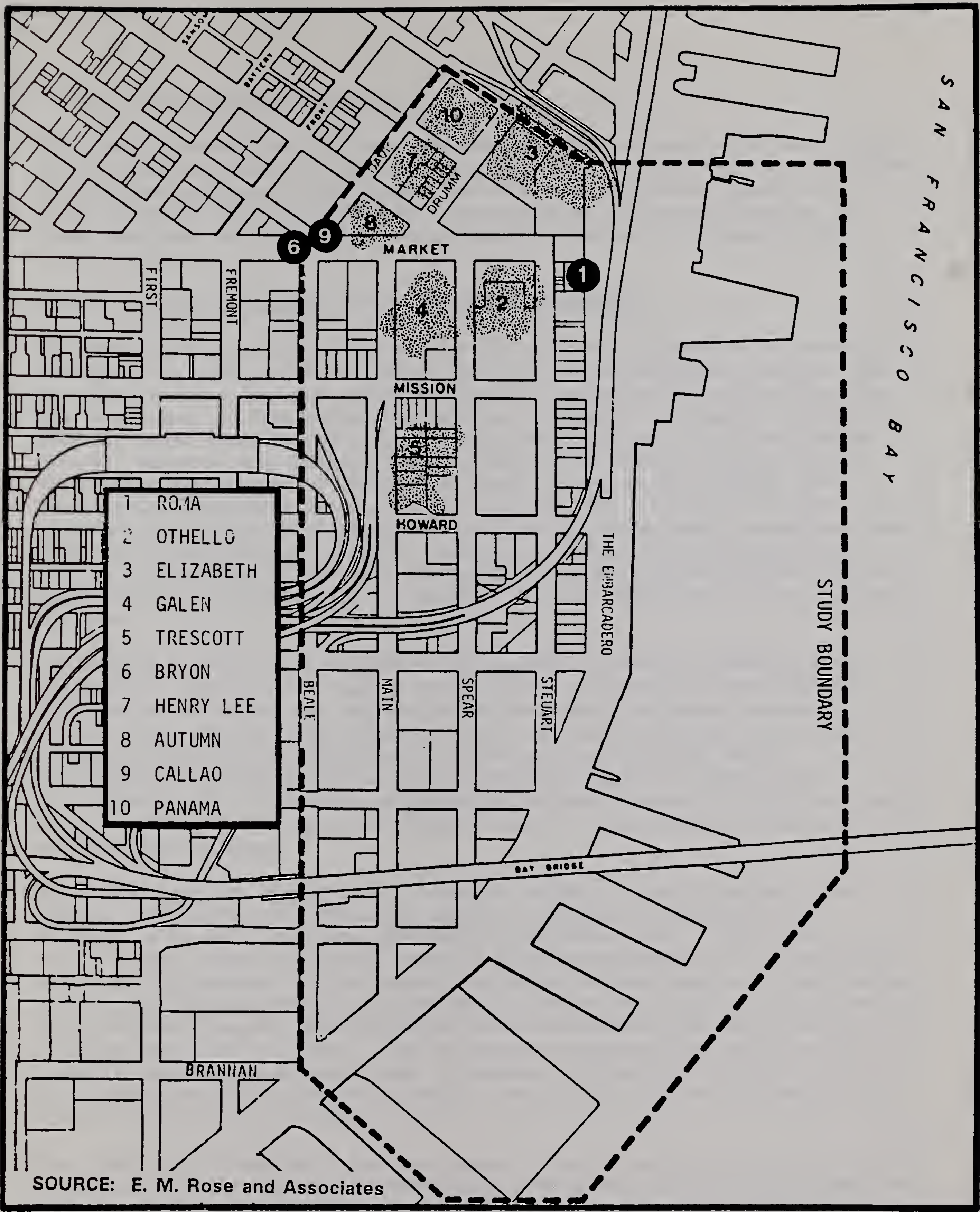
Galen. On lower side of Market Street, bow pointing west. Main, Spear, Market, Mission. Unsure of final disposition.

Othello. On Steuart Street lot, upper half of block. Steuart, Spear, Market, Mission. Unsure of final disposition.

Rome (Roma). Corner of East and Market off the street on a lot. East, Steuart, Market, Mission. Sure of final disposition.

Trescott. Intersection of Main and Mission, at angle pointed northeast. Main, Spear, Mission, Howard. Final disposition unsure.

Source: National Maritime Museum, J. Porter Shaw Library, San Francisco.


SAN FRANCISCO BAY
STUDY BOUNDARY
SANSOME
BATTERY
FRONT
DAVIS
DRUMM
MARKET
FIRST
FREMONT
MISSION
HOWARD
THE EMBARCADERO
BEALE
MAIN
SPEAR
STEUART
BAY BRIDGE
BRANNAN
1 ROMA
2 OTHELLO
3 ELIZABETH
4 GALEN
5 TRESCOTT
6 BRYON
7 HENRY LEE
8 AUTUMN
9 CALLAO
10 PANAMA

SOURCE: E. M. Rose and Associates

FIGURE 3.13-3 SUNKEN GOLD RUSH ERA STORE SHIPS

▨ GENERAL AREA OF ASSUMED LOCATION-FINAL DISPOSITION UNKNOWN

● KNOWN LOCATION OF FINAL DISPOSITION

SOURCE: NATIONAL MARITIME MUSEUM, J. PORTER SHAW LIBRARY, SAN FRANCISCO

800 FEET

3.14 PARKLANDS (SECTION 4(f))

This section summarizes the legal and regulatory requirements for Section 4(f) of the 1966 Department of Transportation Act (49 U.S.C. 1653(f)) and describes the existing parklands, open spaces, and historic properties potentially affected by the Turnaround Project. Discussion of the adverse effects on these parklands and properties can be found in Section 4.14, pages 4.14-1 through 4.14-6.

3.14.1 APPLICABLE LEGAL AND REGULATORY REQUIREMENTS

The Section 4(f) mandate is to make special efforts to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and any historic sites. In response to that mandate, the U.S. Department of Transportation (DOT) has developed a process to preserve publicly owned lands by requiring a comprehensive review of all impacts to natural, cultural and historic resources as a condition to project approval and funding authorization. More specifically, Section 4(f) permits the Secretary of Transportation to approve a project which requires the use of a historic site, of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance only if (1) there is no feasible and prudent alternative and (2) the project includes all possible planning to minimize harm to the property resulting from such use.

The vehicle by which this protection is provided is called a Section 4(f) statement, a detailed description of pertinent resources affected, impacts from project alternatives, and mitigation measures to minimize adverse effects. The Section 4(f) statement was circulated to Federal, State, and local agencies with jurisdiction over affected resources for their consultation and comment as part of the Draft EIS public review process. After receipt of all comments, a determination must be made by UMTA that there is "no feasible and prudent alternative" and that all possible mitigation measures are included.

The 4(f) evaluation compares the potential impacts of each alternative on Section 4(f) lands and whether the impacts could have a bearing on the decision to be made regarding selection of an alternative. The impact analysis was limited to general types of effects occurring if an alternative was to be implemented. A preliminary determination was made as to whether any of the four alternatives could avoid use of Section 4(f) lands. The potential for additional feasible and prudent alternatives which could avoid the use of 4(f) land was also evaluated. The preliminary determination considered all possible planning to minimize harm to Section 4(f) lands. The final Section 4(f) determination is limited to impacts associated with the construction of the preferred project alternative.

This Section 4(f) statement has been prepared concurrently with a Section 106 evaluation for historic and archaeological resources. Section 106 of the 1966 National Historic Preservation Act requires that impacts from federally assisted projects be examined for effects on all historic districts, sites, buildings, structures or objects and archaeological sites listed or eligible for inclusion in the National Register of Historic Places. The Act also requires that the Advisory Council on Historic Preservation be given the opportunity to comment on undertakings that affect such properties. A section 4(f) is required for those properties included or eligible for inclusion in the National Register and for which potential adverse impacts may result from Project implementation or operation. A Section 106 evaluation has been prepared for historic and archaeological resources within the areas of potential environmental impact for the four MUNI Metro Turnaround alternatives. Details of the historical record research are presented in Reference Document 10 (see Table of Contents). This document presents the results of a block-by-block survey of the project area utilizing 19th Century Sanborn insurance maps and was prepared for this Turnaround Project at the request of SHPO. Information pertinent to Section 4(f) findings from the preliminary Section 106 historic survey and archaeological report has been incorporated into this Section 4(f) statement. (Refer to Section 3.13 of this Environmental Impact Statement for potential Section 106 involvement.)

3.14.2 USE OF PARKLANDS AND RECREATION AREAS

The following historic, archaeological, public park and recreational resources were considered for potential Section 4(f) involvement. These resources were selected based on 1) being at least partially located within the areas of potential environmental impact for the MUNI Metro Turnaround project alternatives and 2) having national, State or local significance. A historic site is significant only if it is on or eligible for inclusion on the National Register of Historic Places, or if the U.S. Department of Transportation (DOT) determines that Section 4(f) is appropriate. Section 4(f) applies to all archaeological sites on or eligible for inclusion on the National Register, including those discovered during construction, unless DOT in consultation with the State Historic Preservation Office and Federal Advisory Council on Historic Preservation determines a site has minimum value for preservation in place. Findings of significance are made by City of San Francisco officials having jurisdiction over these lands. No wildlife refuges subject to Section 4(f) involvement are located in the MUNI Metro Turnaround project area of potential environmental impact.

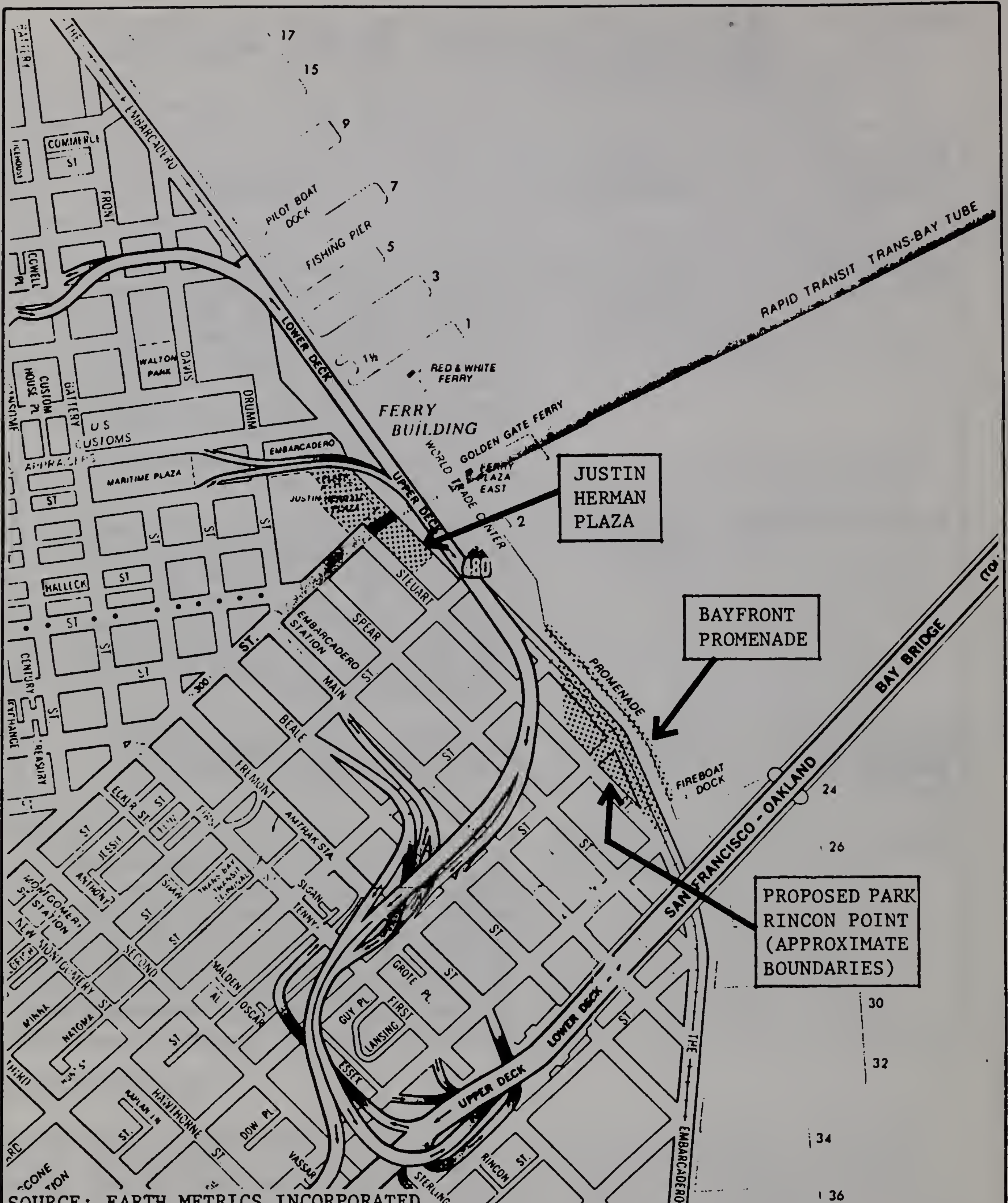
Table 3.14-1 lists significant recreational resources within the areas of potential environmental impact for one or more of the MUNI Metro Turnaround project alternatives. Figure 3.14-1 indicates the locations of these recreational resources. The recreational resources listed are the Justin Herman Plaza, the Bayfront Promenade, and the proposed Rincon Point Park. Information pertaining to these recreational resources was provided by the City Department of Parks and Recreation, the Port of San Francisco, and the Redevelopment Agency of San Francisco, respectively.

JUSTIN HERMAN PLAZA

Description and Significance. Justin Herman Plaza is an existing, city owned park of approximately five acres. The park is located at the foot of Market Street along the Embarcadero from the MUNI bus turnaround to Washington Street (see Figures 3.14-1 and 3.14-2). Access to the park is provided from the streets surrounding the park such as Market Street, Mission Street, Clay Street, Washington Street and the Embarcadero Roadway. The park contains brick paved areas, landscaped trees and grass (detailed in Section 3.11, Biology), a pool with a free form sculptured fountain (Vallaincourt Fountain), which recirculates 30,000 gallons of water per minute, and an open air stage.

TABLE 3.14-1. EXISTING AND PROPOSED PARKS AND RECREATION AREAS WITHIN THE AREAS OF POTENTIAL ENVIRONMENTAL IMPACT OF THE MUNI METRO TURNBACK ALTERNATIVES

RECREATIONAL FACILITY	AGENCY JURISDICTION	DESCRIPTION
Justin Herman Plaza	San Francisco Department of Recreation and Parks	A five acre L-shaped park and plaza located at the foot of Market Street along the Embarcadero from the MUNI bus turnaround to Washington Street. Contains brick paved area, landscaped trees and grass, and a pool with a free form sculptured fountain (Vallaincourt Fountain). Activities include concerts, political rallies, theatrical presentations, and picnicking during the noon hour.
Bayfront Promenade	Port of San Francisco	A pedestrian promenade of approximately 1,600 feet in length beginning at the foot of Mission Street near the Agriculture Building and extending to Pier 24. Activities include walking, viewing events such as boat races and fleet week, in addition to picnicking during the noon hour.
Bayside Plaza Building Open Space	State of California	Small outdoor plaza fronting The Embarcadero at Howard Street.
Rincon Point Park	San Francisco Redevelopment	A proposed 5.5 acre city park to be built in the area vacated by the Embarcadero Roadway (upon realignment) and on Assessor Blocks 3,742 and 3,743. This park would be adjacent to and inland of the Bayfront Promenade. Activities would include a play structure, a tot lot, indoor and outdoor dancing, and restaurants.


JUSTIN
HERMAN
PLAZA
BAYFRONT
PROMENADE
PROPOSED PARK
RINCON POINT
(APPROXIMATE
BOUNDARIES)
RAPID TRANSIT TRANS-BAY TUBE
FERRY
BUILDING
GOLDEN GATE FERRY
RED & WHITE
FERRY
FERRY
PLAZA
EAST
WORLD TRADE CENTER
PILOT BOAT
DOCK
FISHING PIER
FIREBOAT
DOCK
PROMENADE
SAN FRANCISCO - OAKLAND BAY BRIDGE
EMBARCADERO
LOWER DECK
UPPER DECK
EMBARCADERO
STATION
MARITIME PLAZA
WALTON
PARK
US
CUSTOMS
CUSTOM
HOUSE PL
BATTERY
FRONT
DAVIS
DRUMM
STEUART
SPEAR
MAIN
BEALE
FREMONT
FIRST
SECOND
AMTRAK STA
HOWARD
FOLSOM
MONTGOMERY
ST STATION
NEW MONTGOMERY
MINNA
NATOMA
HAWTHORNE
ESSEX
GUY PL
LANSING
GROTE PL
RINCON
STERLING
VASSAR
DOW PL
MALDEN
OSCAR
TENNY
JESSIE
ECKER
ANTHONY
HALLECK
COMMERCIAL
CENTURY
EXCHANGE
TREASURY
COWELL
PL
17
15
9
7
5
3
1
1½
2
24
26
30
32
34
36
80

SOURCE: EARTH METRICS INCORPORATED

N

SCALE
1" = 750'

FIGURE 3.14-1 LOCATIONS OF SECTION 4(f) PARK AND RECREATION AREAS

PLATE A:

PLATE B:

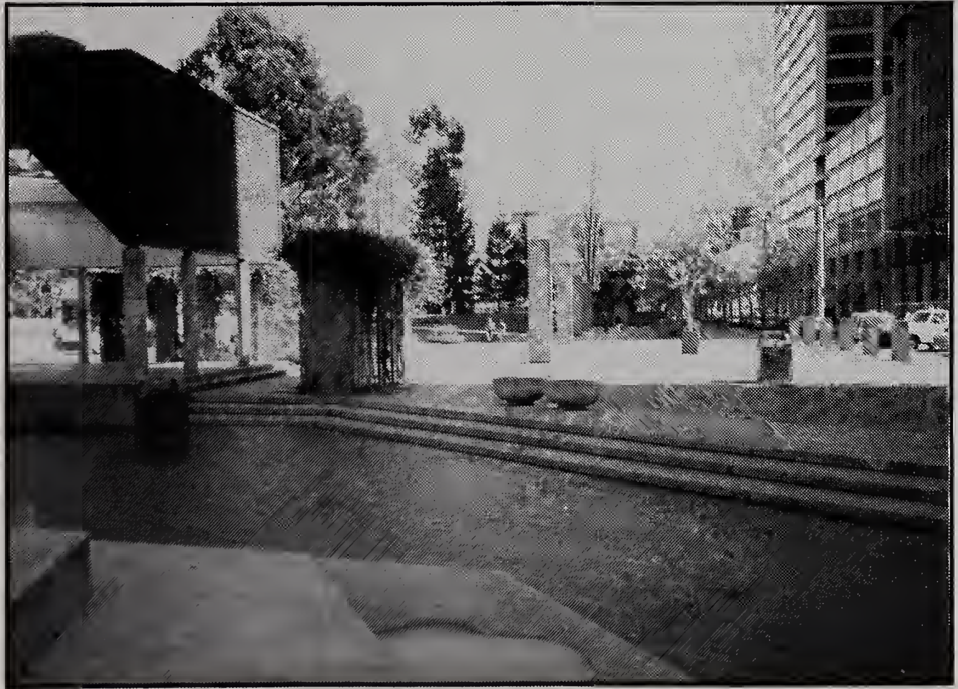


PLATE C:

PLATE A: VIEW OF STREET ARTISTS ALONG MARKET STREET FACING SOUTHWEST.

PLATE B: VIEW OF THE VALLA INCOURT FOUNTAIN WITH JUSTIN HERMAN PLAZA FACING NORTH.

PLATE C: VIEW OF JUSTIN HERMAN PLAZA FACING SOUTHEAST. NOTE THE THEATER STRUCTURE TO THE LEFT OF THE PHOTOGRAPH.

FIGURE 3.14-2 PHOTOGRAPHS OF THE JUSTIN HERMAN PLAZA

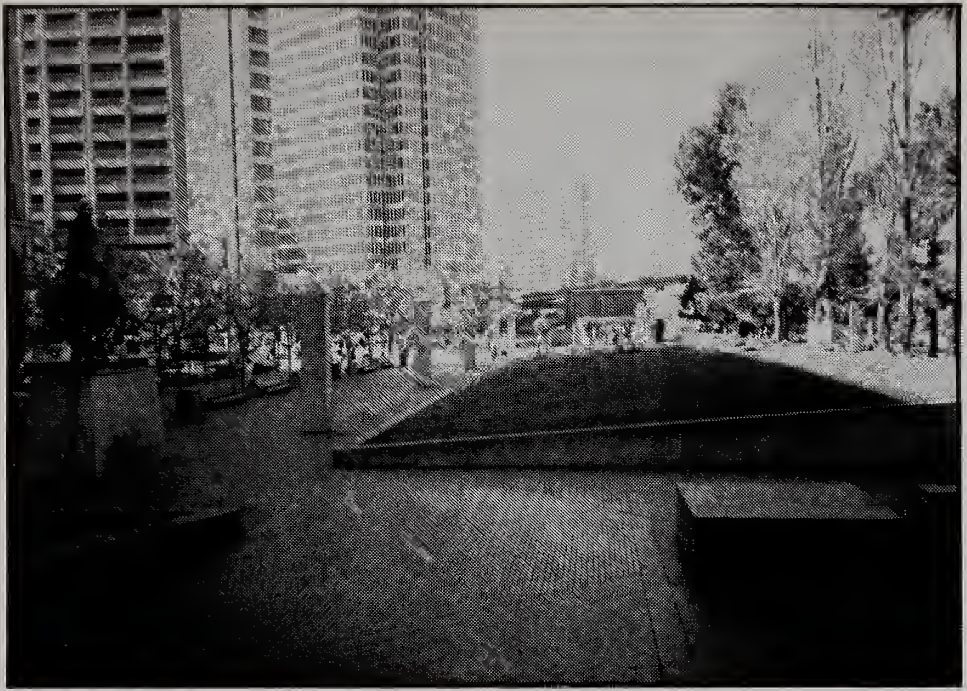


PLATE D:

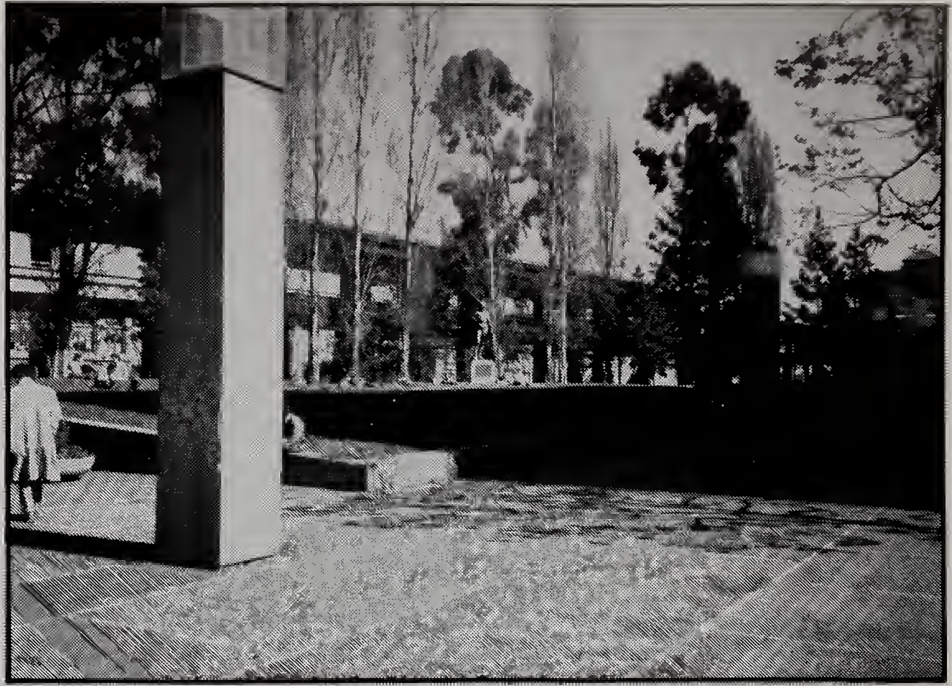


PLATE E:

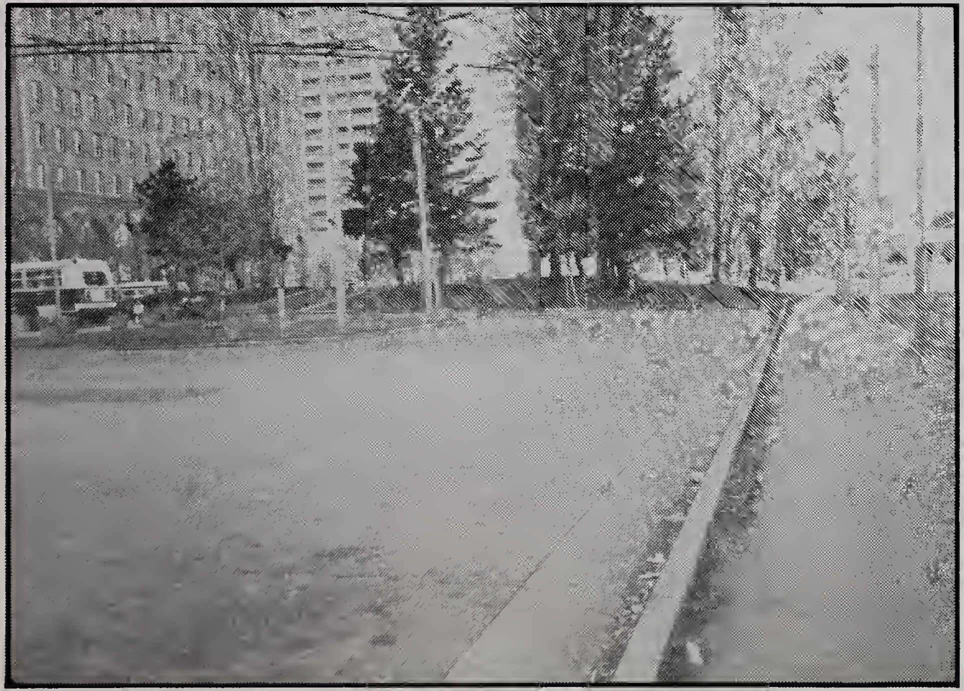


PLATE F:

PLATE D: VIEW OF THE PLAZA FACING NORTHWEST.

PLATE E: VIEW OF THE PLAZA FACING SOUTHEAST.

PLATE F: VIEW OF THE SOUTHERNMOST POINT OF THE PLAZA FACING THE NORTHWEST. IN THE FOREGROUND THE MUNI BUS TURNAROUND IS VISIBLE. TO THE RIGHT OF THE PHOTOGRAPH IS THE EMBARCADERO ROADWAY.

FIGURE 3.14-2 (CONT.) PHOTOGRAPHS OF THE JUSTIN HERMAN PLAZA

The park was built in 1971 and is frequented by shoppers from the Embarcadero Center and people from the surrounding businesses who come to eat lunch. During the noon hour between 12 P.M. and 1:30 P.M. it is estimated that three thousand to eight thousand people utilize the park (Ashe, 1988). Activities that take place at the park include concerts, political rallies and gatherings, and theatrical presentations. A portion of the park near Market Street is used by street artists which sell their handmade artwork (see Figure 3.14-2, Plate A). The park can be reserved for the activities mentioned above.

The months of May, October, and September are good weather months for the use of the park and therefore many events take place in these months, even though there are year round events. The San Francisco Recreation and Parks Department generates revenues from issuing permits for special events and also to street artists. The City Park and Recreation Department charges between $100 to $500 per event for the issuance of permits and use of park facilities (Ashe, 1988). The park is maintained by the Embarcadero Center.

BAYFRONT PROMENADE

Description and Significance. The Bayfront Promenade is owned by the Port of San Francisco (State of California) and is a pedestrian promenade for the use and enjoyment of City residents and visitors alike. Starting just below the Ferry Building complex it runs in a straight axis for 1,200 feet before bending and introducing the piers of a still active south waterfront (see Figures 3.14-1 and 3.14-3). The total length of the Promenade is approximately 1,600 feet. The Promenade replaces Piers 14 through 22 which were some of the oldest and most obsolete piers on the waterfront (Rossi, 1988). Moorings off shore (approximately 20) are provided free of charge for day use of small crafts. Access to the Promenade is provided by the Embarcadero Roadway and also crosswalks at Mission, Howard, Folsom and Harrison Streets.

The Promenade, besides being a place where people can get to the water, is also thought of as a place where people on the water may get to the City. To this end, broad flights of steps go down into the tidal water.

BAYSIDE PLAZA BUILDING OPEN SPACE

Description and Significance. The small plaza fronting the eastern end of the Bayside Plaza Building along The Embarcadero is public open space owned by the State of California and contains a sculpture and tables for outdoor eating. The plaza lies directly across The Embarcadero from the Bayfront Promenade.

RINCON POINT PARK

Description and Significance. The Rincon Point park is a proposed 5.5 acre park to be built by the San Francisco Redevelopment Agency on Port of San Francisco property after rerouting the Embarcadero Roadway onto Steuart Street between Howard and Harrison takes place. Although this park facility is proposed to be constructed by the Redevelopment Authority, it has not been designed and, therefore, more detailed information on this future park is lacking. Figure 3.14-1 shows the location of the proposed park, which is proposed for the area vacated by the Embarcadero Roadway and on Assessor Blocks 3742 and 3743, adjacent to and inland of the Promenade. The park will serve as the terminus of the Rincon Hill Pedestrian Corridor and will relate to the recreational preferences of residents, employees of the area, and tourists.

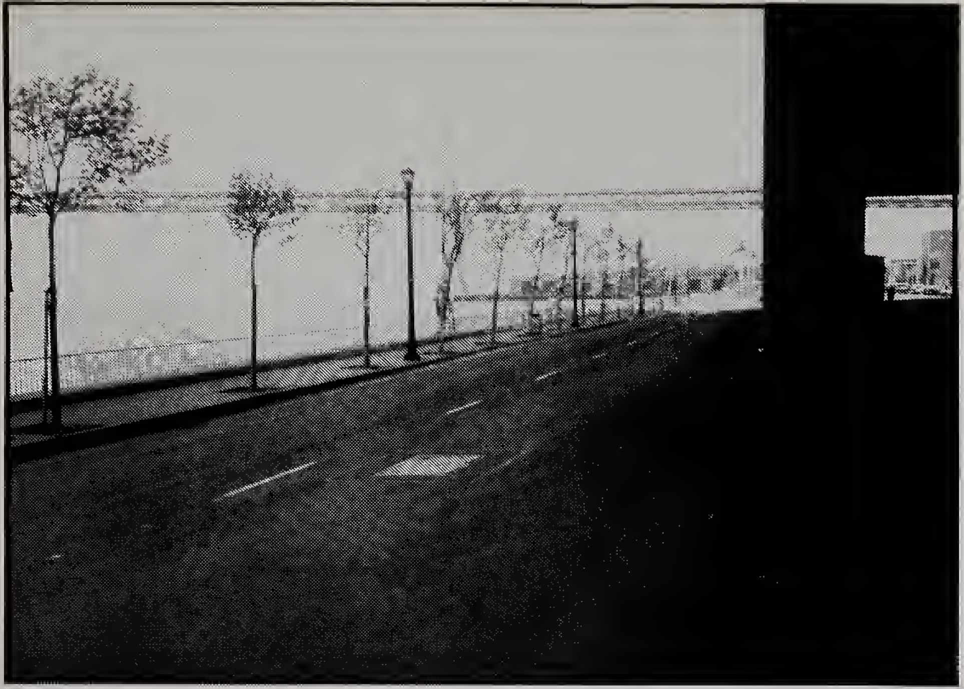


PLATE A:

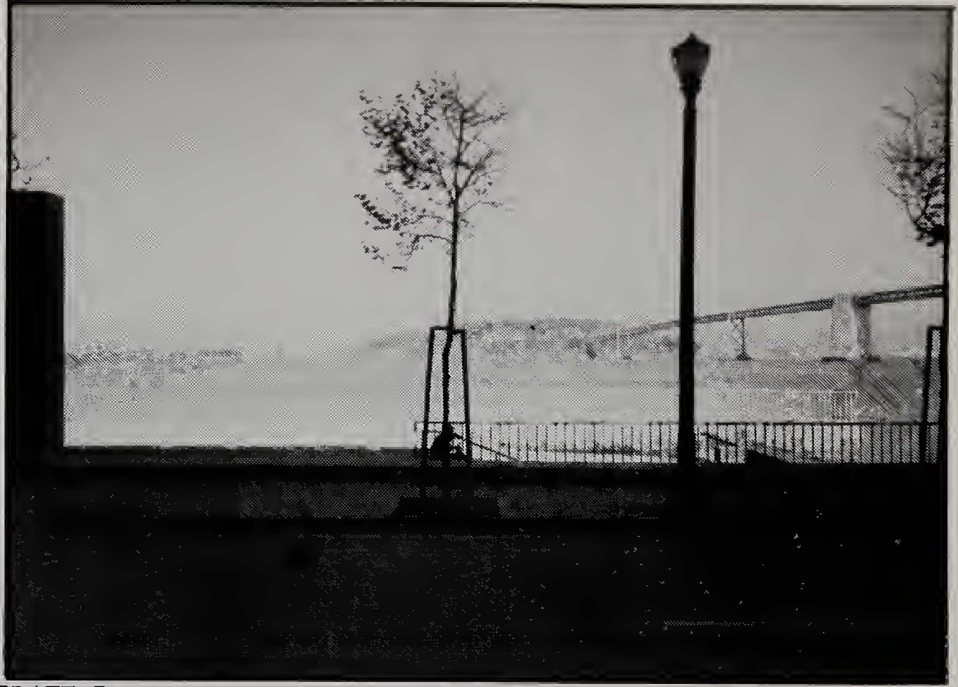


PLATE B:

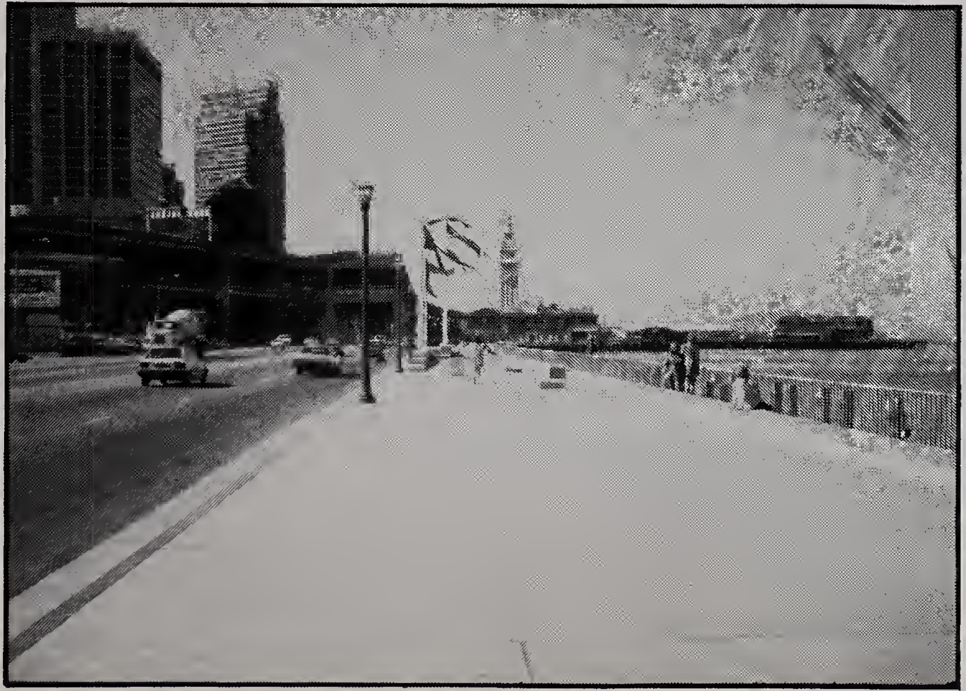


PLATE C:

PLATE A: VIEW OF THE EMBARCADERO ROADWAY ALONG THE BAYFRONT PROMENADE FACING SOUTHEAST CUT AND COVER CONSTRUCTION WILL TAKE PLACE WITHIN THE EMBARCADERO ROADWAY.

PLATE B: VIEW OF THE BAYFRONT PROMENADE STANDING ACROSS NORTHBOUND EMBARCADERO ROADWAY FACING THE BAY.

PLATE C: VIEW OF THE BAYFRONT PROMENADE FACING NORTH.

FIGURE 3.14-3 PHOTOGRAPHS OF THE BAYFRONT PROMENADE

3.14.3 HISTORIC RESOURCES POTENTIALLY AFFECTED

The historic/architectural buildings are discussed in Section 3.13. A summary of the historic resources within the area of potential environmental impact is presented in Table 3.13-1. The location of these resources is illustrated by Figure 3.13-2. A comprehensive listing of historic resources in the general study area is presented in San Francisco Municipal Railway Turnaround Project Historical and Cultural Research to 1887, Reference Document No. 10.

Section 3.13.3 denotes small amounts of artifactual materials found in the study area as a result of preconstruction borings for the San Francisco Wastewater Program in 1977. Also identified are possible locations of buried storehouse ships, shown in Figure 3.13-3.

CHAPTER 4

4. ENVIRONMENTAL CONSEQUENCES AND PROPOSED MITIGATION

This chapter provides an evaluation of the impacts of the Turnaround Project per alternative for each of the areas identified in Chapter 3, "Existing Setting". Because Alternatives 1 and 2, the Surface and Underground Alternatives respectively, are build alternatives, involving substantial construction and additional MUNI Metro operating requirements, their impacts are examined with much greater detail than Alternatives 3 and 4, the Transportation Systems Management and No-Action Alternatives. Often, there are no impacts related to Alternatives 3 and 4, and, if this situation occurs, the no-build alternatives are omitted from the discussion.

Impacts in Chapter 4 are distinguished between short and long term impacts. The time frame for short term impacts corresponds to the construction period. Therefore, short term impacts are basically construction related impacts. Long term impacts relate to the beneficial and adverse effects of project completion and turnback operation. The sole unmitigated significant impact involves visual intrusions during the construction period. Specifically, cut and cover excavation with portal construction will occur along The Embarcadero to Howard Street. The Underground Alternative will have slightly greater visual impact since excavation will continue south of Howard Street. Both build alternatives will require the use of disposal and other heavy equipment at the tunnel excavation site adjacent to the MUNI bus turnaround. Hoses necessary for grouting work will be emplaced for a three week period on the grassy knoll in the southern end of Justin Herman Plaza.

It is the intent of this chapter to identify all practical mitigation measures that can render an impact to a level of non-significance and to determine those impacts that are unmitigable. Additionally, since Alternatives 1 and 2 are very similar in concept, the differences between the two alternatives are emphasized, whenever appropriate. This format should help clarify the advantages of one alternative over another and help explain the tradeoffs considered when making the final decision on the preferred alternative.

4.1 LAND USE, PLANNING AND PUBLIC POLICY

4.1.1 LAND USE

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction would most directly effect access to business along The Embarcadero, especially the East Street Row between Mission and Howard Streets. Vehicular access to Port of San Francisco facilities may be affected along the waterfront side of the project area.

Other land uses within the study area which may experience short-term construction impacts include the MUNI Bus Turnaround and Justin Herman Plaza. Refer to Section 4.4, Traffic and Transportation, for a discussion of the Bus Turnaround potential impact and Sections 4.3, Economic and Financial Characteristics; 4.9, Construction Methods; and 4.14, Parkland (Section 4f, Compliance); for a discussion of potential impacts related to Justin Herman Plaza.

LONG TERM. The alignment would not result in direct long-term impacts on the land uses north of Howard Street. However, the portal and the transition of the alignment from subsurface to surface at this location would change the existing character of the area below the freeway structure. This potential impact is discussed further under Section 4.5, Urban Design.

South of Howard, land use changes which would occur within the study area are associated with the Embarcadero Roadway Project which provides a median for the Turnaround alignment. These land use changes are related primarily to the realignment of the Embarcadero Roadway to accommodate the proposed Rincon Point Park. Existing land uses which would be affected by the realignment of The Embarcadero include the Port-owned surface parking area below the freeway, the adjoining wood-framed structure also on Port property, and the Marine Terminals Corporation property. These properties would be displaced by the Embarcadero Roadway and are referenced here for purposes of clarification. Impacts related to these properties and applicable relocation assistance programs would be addressed by the Embarcadero Roadway Environmental Assessment.

Since the tracks for Alternative 1 extend an additional 2,200 feet to the south, the Surface Alternative would enhance future transit accessibility to adjoining land uses when considered in conjunction with the future MUNI Metro Extension. The turnback operation as proposed within the Embarcadero Roadway median between Harrison and Bryant Streets would not directly affect adjoining land uses. The Redevelopment Agency's South Beach Redevelopment Project includes the current construction of Bayside Village and the Embarcadero Plaza which are adjacent to the southern end of the Turnaround study area. These two medium- to high-density housing projects, together with the redevelopment of the Hills Brothers Coffee complex at Harrison and The Embarcadero, suggest the need for non-industrial uses or less intensive industrial uses on the piers between the Ferry Building and China Basin. Further, the City's Rincon Hill Plan specifies a pedestrian open space connection from a proposed high-density Rincon Hill housing district through the Hills Plaza complex, to an Embarcadero open space and recreation area.

The turnback function of the Surface Alternative would be located in close proximity to the possible future industrial use of Pier 30-32; this industrial use will require truck and rail access. The function of the turnback near Pier 30-32 is such that it will primarily be used during peak periods; and will only involve rail vehicles in the location for short durations. However, when considered collectively in the broader context of other potential development, surface turnback operations could contribute to a future inconsistency between nearby impending and proposed City and privately-sponsored development and possible industrial use of Pier 30-32. See further discussion of Alternative 1 under Urban Design impacts. Surface turnback operations are generally inconsistent with the City's waterfront planning and development policy.

Mitigation Measures

SHORT TERM. Emergency access and pedestrian access to affected properties would be maintained to buildings during the construction. East Street Row buildings have access from The Embarcadero and access from Steuart Street. Vehicular access would be maintained to Pier 22-1/2, the Fire Boat Station, and all Port of San Francisco pier facilities in the construction area. Mitigation could be provided for the loss of parking during construction.

LONG TERM. The intensity of future development of Pier 30-32 in conjunction with high-density housing and commercial development in adjoining areas could impact surface turnback operations. The related impacts and mitigation measures which are associated with the right of way of the Embarcadero Roadway Project would be addressed by the Environmental Assessment for the Embarcadero Roadway.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Construction may result in settlement and cracking of the East Street Row building facades and features since the Underground Alternative alignment is closer to East Street Row.

LONG TERM. There is one principal difference in the long-term land use impact of Alternatives 1 and 2. The Surface Alternative presents potential land use conflicts south of Folsom Street, particularly to Pier 30-32, which are not affected by the shorter alignment in the Underground Alternative. The Underground Alternative also minimizes conflicts between the Turnback facility and Hills Plaza, as well as other non-industrial land use.

Mitigation Measures

Construction procedures would include preconstruction surveys of affected buildings and structures as well as monitoring potential building settlement and cracking during construction. Construction procedures would be modified as required to minimize potential impact. Potential cracks in building facades and features resulting from construction will be repaired as required.

TRANSPORTATION MANAGEMENT SYSTEM ALTERNATIVE

Impacts

SHORT TERM. There would be no short-term land use impacts associated with Alternative 3.

LONG TERM. Transportation System Management measures provide minimal transit improvements which do not meet related planning objectives to increase peak service capacity of the MUNI Metro system.

NO-ACTION ALTERNATIVE

SHORT TERM. There would be no short term land use impacts related to Alternative 4.

LONG TERM. The No-Action Alternative is not consistent with San Francisco's Transit First Policy and with elements of the Comprehensive Plan. Peak service capacity cannot be improved under this alternative.

4.1.2 PLANS AND POLICIES

SURFACE AND UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. There are no short-term plans and policies impacts which have been identified for Alternatives 1 and 2.

LONG TERM. A number of City agencies will be directly and indirectly involved in the review, approval, and implementation of individual elements of this alternative. The San Francisco City Planning Commission and Department of City Planning review projects for their consistency with the Comprehensive Plan and, if appropriate, could amend the Comprehensive Plan to be consistent with the Turnaround Project. The Board of Supervisors would approve any implementing measures related to the Turnaround Project by resolution and/or ordinance. The Utilities Engineering Bureau (UEB) and MUNI would be implementing agencies for the proposed project. UEB and MUNI, which are under the jurisdiction of the San Francisco Public Utilities Commission, would be responsible for constructing and operating the Turnaround Project, respectively. The Department of Public Works would be responsible for city street modifications.

The San Francisco Comprehensive Plan Energy Element specifies energy-efficient transportation alternatives. The MUNI Metro is powered by electricity, a clean energy resource. The Metro transit system is also energy efficient, i.e., it requires less fuel per passenger mile than automobiles. The Environmental Protection Element goals and objectives are supportive of enhancements to the Metro system as the project would permit increased transit capacity of electrically-powered light rail vehicles. The Transportation Element establishes a policy of priority for public transit in San Francisco and advocates transit service improvements in the central city area. These goals and objectives would be advanced with the construction of the MUNI Metro Turnaround. The Central Waterfront Plan specifies the extension of the light rail vehicle route through the central waterfront along the Third Street corridor. Building the Turnaround would assist in the implementation of that plan goal.

The Downtown Plan specifies improvements to the MUNI Metro service as a key element in the city's capacity to absorb increased growth predicted in the Downtown Plan. The Turnaround Project was found to be essential for increasing peak service capacity on the MUNI Metro system.

The Northeastern Waterfront Plan specifies that improved public transit service be developed in preference to private vehicle facilities. The Rincon Hill Plan calls for enhanced public transit service to the Rincon Hill area. The South of Market Plan states that the area is deficient in transit service. All San Francisco plans and policies advocate improved transit service and favor expansion of MUNI Metro capacity.

The San Francisco Redevelopment Agency projects within the Redevelopment Agency's Rincon Point-South Beach Project Area are reviewed by the agency for conformance with the Redevelopment Plan. The Turnaround will be built adjacent to an area that will be developed into a waterfront park along The Embarcadero between Howard and Harrison. The Redevelopment Plan features: high-density residential development on the Howard Street end of the Rincon Annex site, a proposed hotel bayside of the Embarcadero Freeway fronting on Folsom, and several blocks of high-density residential development inland of The Embarcadero from Bryant to King Streets on six separate blocks. The Rincon Point-South Beach Redevelopment Plan encourages the extension of MUNI Metro rail service into the area. Alternative 1 would have a potential impact and visual clarity to the waterfront from the Redevelopment Agency project housing areas.

The Turnaround Project area is within the Port of San Francisco jurisdiction for the two blocks of Steuart from Howard Street and for any portions of the Turnaround facility extending onto The Embarcadero at or near Harrison Street. The Port Commission Resolution No. 87-96 specifies guidelines for review, approval, and mitigation of public agency-sponsored projects on Port lands. Review and approval would be required at the schematic design review, working design review, and final review/contract documents stages. Compensation at fair market value could be required for the loss of Port revenues or lands. Port of San Francisco review will therefore focus on the impact of the Metro Turnaround Project on Port operations, revenues, and lands. The Port is also responsible for consulting with the State Lands Commission to establish conformance with the public trust provisions of the Burton Act. Specific impacts on the Port include the partial loss of Port lands and parking revenues resulting from the Turnaround, Roadway, and Rincon Point Park Projects.

The Port could either enter a lease agreement or make a land exchange (via a lease) for lands. The stipulation would be that these projects must not interfere with the Port of San Francisco's ability to manage the rest of its land for maritime purposes. Prior to any final decision, however, the Port would have to make two special findings under their Burton Act mandate:

that the Port's public trust role in the management of State lands is not jeopardized by the Turnaround Project; and that the continued viability of rail service in the seaport sections of the waterfront area is not jeopardized by the Turnaround.

The San Francisco Art Commission was founded in 1932 to support and encourage community participation in performing and visual arts programs. It approves all works of art placed on City or County property and reviews the design of structures, viaducts, bridges and the like erected over or on any street or public place. The Commission's jurisdiction also encompasses all Port lands. The Art Commission has the responsibility to review the Turnaround Project. Concerns addressed during the Commission's review would include the quality and appropriateness of both the type of building materials used and the civic and aesthetic merits of designs. This project is not subject to arts adornment and may not be eligible for Federal participation.

TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE

The TSM Alternative provides minimal transit improvements which do not meet related planning objectives to increase peak service capacity of the MUNI Metro system.

NO-ACTION ALTERNATIVE

The No-Action Alternative is inconsistent with San Francisco's Transit First Policy and with elements of the San Francisco Comprehensive Plan. Without the Turnaround Project, operations of the MUNI Metro system and public rail transit in the downtown core area could not be improved.

4.2 SOCIAL AND COMMUNITY CHARACTERISTICS

4.2.1 RESIDENTIAL POPULATION AND AFFECTED SOCIAL GROUPS

SURFACE AND UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. None anticipated.

LONG TERM. The MUNI Metro Turnaround Project could have direct or indirect impacts on residential population growth and demographic trends within and outside the project area. For example, the Turnaround Project would provide additional capacity for the MUNI Metro system, particularly during peak periods. The added capacity is not anticipated to induce residential development along MUNI Metro routes, but it would provide improved access to the established downtown.

The MUNI Metro Extension could provide greater access and perhaps increase MUNI's share of the modal split along The Embarcadero and King Street Corridor (see Section 4.15, Secondary Impacts of the MUNI Metro Turnaround Project). Along this corridor, 2,900 housing units and the approximately 1.1 million square feet of office/retail development are contemplated not including Mission Bay. The project would benefit residents and office workers through the provision of high quality frequent Metro Service. However, it is not anticipated that Metro projects related to or resulting from the Turnaround Project will induce greater development than the Redevelopment and City Specific Plans envision.

Mitigation

None required.

TSM AND NO ACTION ALTERNATIVES

No significant direct impacts, although without the Turnaround Project access to MUNI Metro could not be provided by way of a southern Metro extension.

4.2.2 HOUSING

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. The construction of Alternatives 1 and 2 would not result in the removal of residential units. However, there is the potential of disturbance to the residents at the YMCA, which houses both transients and temporary residents (over 30 day rentals), due to the additional noise of the pile driving in the already noisy area. The additional noise would not cause the facility to close. If relocation takes place, it would be the choice of the residents.

LONG TERM. Improved access to public transportation by virtue of the MUNI Metro Extension would further the increase of the land value of residential and commercial developments in the project area. As land values rise in the study area, the few remaining low income housing units and "underutilized" commercial and industrial spaces in the project area may relocate. However, the construction of Alternatives 1 and 2 would provide transit opportunities to those who desire to rent or own housing in the project area, and could allow residents to choose not to own a car.

Mitigation

SHORT TERM. None required.

LONG TERM. None required.

4.2.3 TRANSPORTATION DISADVANTAGED

Impacts

SHORT TERM. None.

LONG TERM. Within the project area in 1980 two census tracts, 178 and 179, had large concentrations of transportation disadvantaged (defined as young, elderly, handicapped, poor people, and those who do not own automobiles, regardless of income). Within these census tracts, 90 percent of the households had no automobiles and 60 percent of their trips to work were either by public transportation or walking. For these transit dependent persons who are presently living and working or those who will move into the project area, improved services provided by Alternatives 1 and 2 in conjunction with an extension of MUNI Metro to Mission Bay will impact transportation disadvantaged residents positively.

4.3 ECONOMIC AND FINANCIAL CHARACTERISTICS

4.3.1 URBAN ECONOMY

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Construction of the project would create temporary employment in the trade industries over the three year construction period. The temporary employment would generate short term revenues to San Francisco and the region. Of the construction workers on major projects in San Francisco, 30 percent live in San Francisco and 70 percent live throughout the region.

Alternative 1, the Surface Alignment, and Alternative 2, the Underground Alignment, each require large construction expenditures, $60.8 million and $83.3 million, respectively. Alternative 1 would directly create approximately 860 person years of employment at one time, of which 207 workers would live in San Francisco and 602 would live throughout the region. Those workers' salaries would generate $42 million, of which approximately $9.3 million would be earned by San Francisco workers and $17,500,000 by workers throughout the region.

Alternative 2 would directly create approximately 1,170 person years of construction employment at one time, of which 351 workers would live in San Francisco and 819 would live throughout the region. These workers would generate $42 million in salaries of which San Francisco workers would generate approximately $12.7 million and workers throughout the region would generate approximately $29.7 million.

While working in San Francisco, regardless of their residency, it is estimated that each worker could spend nearly $1,300 in taxable expenditures during the construction phase. These expenditures could generate $13,800 from Alternative 1 and $18,800 from Alternative 2 in sales tax revenues to San Francisco based on sales tax rate of 0.125 percent.

All firms engaged in the construction of the proposed project would be required to pay payroll taxes on the salaries paid to workers on the job. The San Francisco payroll taxes are based on 1.5 percent of salaries paid to the workers. Alternative 1 workers' salaries would generate approximately $467,000 in payroll taxes and Alternative 2 would generate approximately $636,000 at full employment.

The construction expenditures of the proposed project would create secondary employment throughout the region. The construction of Alternative 1 is anticipated to create approximately 1,300 secondary jobs, and whereas Alternative 2 would create approximately 1,800 secondary jobs.

The employment and revenue impacts of Alternatives 1 and 2 are summarized in Table 4.3-1.

TABLE 4.3-1. CONSTRUCTION RELATED ECONOMIC IMPACTS OF THE SURFACE ALTERNATIVE AND THE UNDERGROUND ALTERNATIVE

ECONOMIC FACTOR	SURFACE ALTERNATIVE	UNDERGROUND ALTERNATIVE
Total Capital Cost (1)	$71,795,000	$91,883,000
Total Right-of-Way Cost	0	0
Total Labor Cost (2)	31,146,500	42,381,500
Direct Employment (3)	860	1,170
San Francisco	258	350
Region	602	820
Salaries Generated		
San Francisco	9,339,600	12,706,200
Region	21,806,900	29,674,800
Payroll Tax at 1.5 Percent of Salaries	467,200	635,700
Sales Tax on Employee Expenditures (4)	13,800	18,800
Construction Secondary Employment (5)	1,333	1,814
Total Employment	2,193	2,984

(1) The basis of these figures is described in the Cost Estimating of the MUNI Metro Turnaround EIS, and includes fixed facilities, rolling stock, TSM, and quantified miscellaneous costs (see page 2-10). All figures are 1988 dollars.

(2) Assumes 50 percent of construction cost is labor.

(3) Based on 1988 average annual construction employee salary of $36,200, Laborer's Master Agreement and Tunnel Master Agreement as of June 27, 1988.

Residential split of 30 percent in San Francisco and 70 percent in the region based on Downtown EIR Consultant's Report, Vol. 1, May 1983, page IV.D.4.

(4) Based on average annual employee expenditures of $1,287. 101 Montgomery Street Office Building FEIR, certified May 7, 1981, page 83, and tax rate of 1.25 percent.

(5) Construction employment multiplier of 1.55 based on San Francisco Bay Area Impact - Outpact Model 1967-1971.

TSM AND NO-ACTION ALTERNATIVES

Since neither of these alternatives requires construction or significant capital expenditures, their impact in terms of the urban economy are negligible.

4.3.2 FISCAL IMPACTS

4.3.2.1 GENERAL

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts. The use of annualized capital costs provides a means of comparing the total costs of the alternatives. The methods and factors are defined in the UMTA DRAFT "Procedures and Technical Methodology for Transit Project Planning" dated September, 1986.

Annualized capital cost is defined as the value of a constant annual payment over the life of the facility, where the sum of all the payments plus interest equals the construction cost of the facility. The annualized costs and the basis for the costs are shown in Table 2.4-2, 2.4-3, and 2.4-5.

Total cost for an alternative is calculated by adding the annualized capital costs to the annual operating and maintenance expenses as shown in Table 4.3-2.

TABLE 4.3-2. ANNUAL COST TO THE CITY AND COUNTY OF SAN FRANCISCO FOR SURFACE AND UNDERGROUND ALTERNATIVES (MILLIONS OF DOLLARS: 1988)

	ALTERNATIVE 1	ALTERNATIVE 2
Annualized Cost		
Fixed Facility	$6.140	$8.409
Rolling Stock	1.00	.720
TSM	.165	.165
Operation and Maintenance Cost	1.32	.87
TOTAL	$8.625	$10.164

4.3.2.2 PORT OF SAN FRANCISCO

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Since parking revenue is a major source of revenue to the Port of San Francisco, any loss of this revenue source could have a negative impact on the Port's ability to maintain its existing services and could jeopardize implementation of future plans. To this end, the design of Alternative 1 and Alternative 2 attempted to minimize the loss of Port parking spaces. The construction of Alternative 1 would displace 120 parking spaces for up to 36 months; the resulting estimated revenue loss to the Port would be $152,000. The construction of Alternative 2 would displace 141 parking spaces for up to 40 months; the estimated revenue loss to the Port would be $371,300.

No loss of revenue to the Port from their restaurant leases or from other tenants due to the construction of either alternative is anticipated. Construction activities could indirectly cause the Port to lose revenue (i.e., from initial leases, repair of and development on deteriorating piers and percentages of gross sales).

The construction of Alternative 1 or Alternative 2 would block access to Harrison Street which may impact the planned development at Pier 24 by eliminating street access from the west. This and other proposed projects planned for the area may limit the development of underutilized Piers 24, 26 and 28, making it difficult for the Port to attract potential developers for those piers due to restricted automobile and truck access.

LONG TERM. None anticipated.

Mitigation

SHORT TERM. The Port of San Francisco may be compensated for loss of parking revenue based on San Francisco Port Commission Resolution No. 87-96. Additionally, the contractor needs to provide continued access across the cut and cover excavation to the Agriculture Building and Piers 24, 26 and 28.

4.3.2.3 RECREATION AND PARK DEPARTMENT

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Justin Herman Plaza, administered and maintained by Recreation and Parks, has become one of the big drawing spots in San Francisco, especially in the downtown area. The construction Alternatives 1 and 2 should cause no disturbance to restaurant activities at the Plaza.

Events are scheduled all year at the Plaza. Some construction activities, such as pile driving, excavation, trucking, and grouting may affect Plaza events.

LONG TERM. None are anticipated.

Mitigation

SHORT TERM. Construction activities should be scheduled to limit conflicts with scheduled events at Justin Herman Plaza.

4.3.2.4 MUNICIPAL RAILWAY

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. The temporary rerouting of trolley lines at the bus turnaround (Steuart/Mission) is expected to require $250,000 for new trolley wire.

LONG TERM. The difference in escalated capital cost between the two alternatives is $30.427 million (Surface Alternative, $81.691 million and the Underground Alternative, $112.118 million).* Yet the operating costs for Alternative 1 are greater than Alternative 2 and, over the life of the project, this cost difference may prove to be a drain on MUNI's financial resources.

The difference in operation and maintenance costs, assuming seven percent annual inflation, is summarized in Table 4.3-3. Over a period of 22 years beginning in 1993, the cumulative operation and maintenance costs would be over $31 million higher for the Surface Alternative than the Underground Alternative, balancing the lower capital cost of the Surface Alternative.

Additionally, since the turnback operation for Alternative 1 is exposed on surface track rather than underground as in Alternative 2, the Surface Alternative presents potentially greater risk for increased claims against MUNI and the City and County of San Francisco (i.e., personal injury claims, vandalism, and noise and visual intrusion claims by residences). Although the cost of these claims cannot be determined at this time, consideration of potential costs should also be included in the determination of the overall cost differences between the two alternatives.

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* Both alternatives would require purchase of additional LRVs. The additional LRVs will require storage space over and above that available at the Green Light Rail Center. These costs are not included in the escalated capital cost estimate.

TABLE 4.3-3. ANNUAL CUMULATIVE OPERATION AND MAINTENANCE COST (MILLIONS OF DOLLARS)

YEAR	SURFACE ALIGNMENT	UNDERGROUND ALIGNMENT	CUMULATIVE DIFFERENCE
1 (1993)	1.85*	1.22*	.63
2	1.98	1.30	1.31
3	2.12	1.40	2.03
4	2.27	1.49	2.81
5	2.43	1.60	3.64
6	2.60	1.71	4.53
7	2.78	1.83	5.48
8	2.97	1.96	6.49
9	3.18	2.09	7.58
10	3.40	2.24	8.74
11	3.64	2.40	9.98
12	3.89	2.56	11.31
13	4.16	2.74	12.73
14	4.46	2.94	14.25
15	4.76	3.14	15.87
16	5.09	3.36	17.60
17	5.45	3.59	19.46
18	5.83	3.85	21.44
19	6.24	4.12	23.56
20	6.67	4.40	25.83
21	7.37	4.70	28.50
22	7.64	5.04	31.10
23	8.17	5.39	33.81
24	8.74	5.77	36.85
25	9.36	6.17	40.04

* 1988 expenses from Table 2.5-1 have been inflated at 7 percent per year to arrive at 1993 O&M costs.

Source: Manuel Padron and Associates, 1985.
Luther Freeman, Municipal Railway, 1988.

4.4 TRAFFIC AND TRANSPORTATION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Short term traffic and transportation impacts of the Surface Alternative are directly related to construction. They will occur as a direct consequence of street opening for cut and cover and bored tunneling. Their duration is related to the sequencing of construction operations which require underpinning of the Embarcadero Freeway structure and the construction of slurry walls to form the tunnel structure.

In the area of construction, through north/south vehicular traffic utilize the Embarcadero Roadway. Steuart Street provides localized north/south access. The Embarcadero has two through lanes northbound and two southbound. These will be maintained during the construction period by shifting the two southbound lanes from their location through the west column bay of the freeway structure to the east column bays (see Figure 4.4-1). This pattern will be maintained during the period of relocation of utilities, construction of struts for tying freeway columns, and installation of street decking, and will require about five months. During this period, the separate southbound dedicated right turn lane to Mission Street will be closed. The two northbound Embarcadero Roadway lanes will not be directly affected by construction operations. East/west traffic to and from The Embarcadero at Mission Street will be maintained by decking the cut and cover excavation.

Steuart Street between Howard and Harrison Streets and The Embarcadero between Harrison and Main Streets would be an area of at grade construction. The Steuart Street construction would occupy a small portion of the westerly side of the road and would allow maintenance of roadway capacity. The Embarcadero construction would occur in an area where the paved roadway has sufficient width to permit maintenance of two lanes in each direction.

Access to the Ferry Building and the Agriculture Building would not be directly affected since the northbound Embarcadero Roadway lanes are not altered. The Audiffred Building, the YMCA and other buildings along the east side of The Embarcadero between Mission and Howard Streets would not be directly accessible for southbound traffic since the third southbound lane would be closed for about five months.

Emergency vehicle access would be basically unchanged except during the few hours when the switchover of southbound lanes between the east and west freeway column bays occurs.

Pedestrian traffic is primarily confined to the Ferry Building and the Agriculture Building areas. The access route from the foot of Market Street to the Ferry Building would not be affected by the construction. However, access along The Embarcadero at Mission and Howard Street intersections, which could be impeded by cut and cover and at-grade construction, would be decked to provide pedestrian access to the Bayfront Promenade.

Some parking spaces beneath the Embarcadero Freeway structure would be temporarily lost due to a change in alignment of the southbound Embarcadero Roadway lanes. Approximately 120 spaces would be lost during construction for about 36 months.

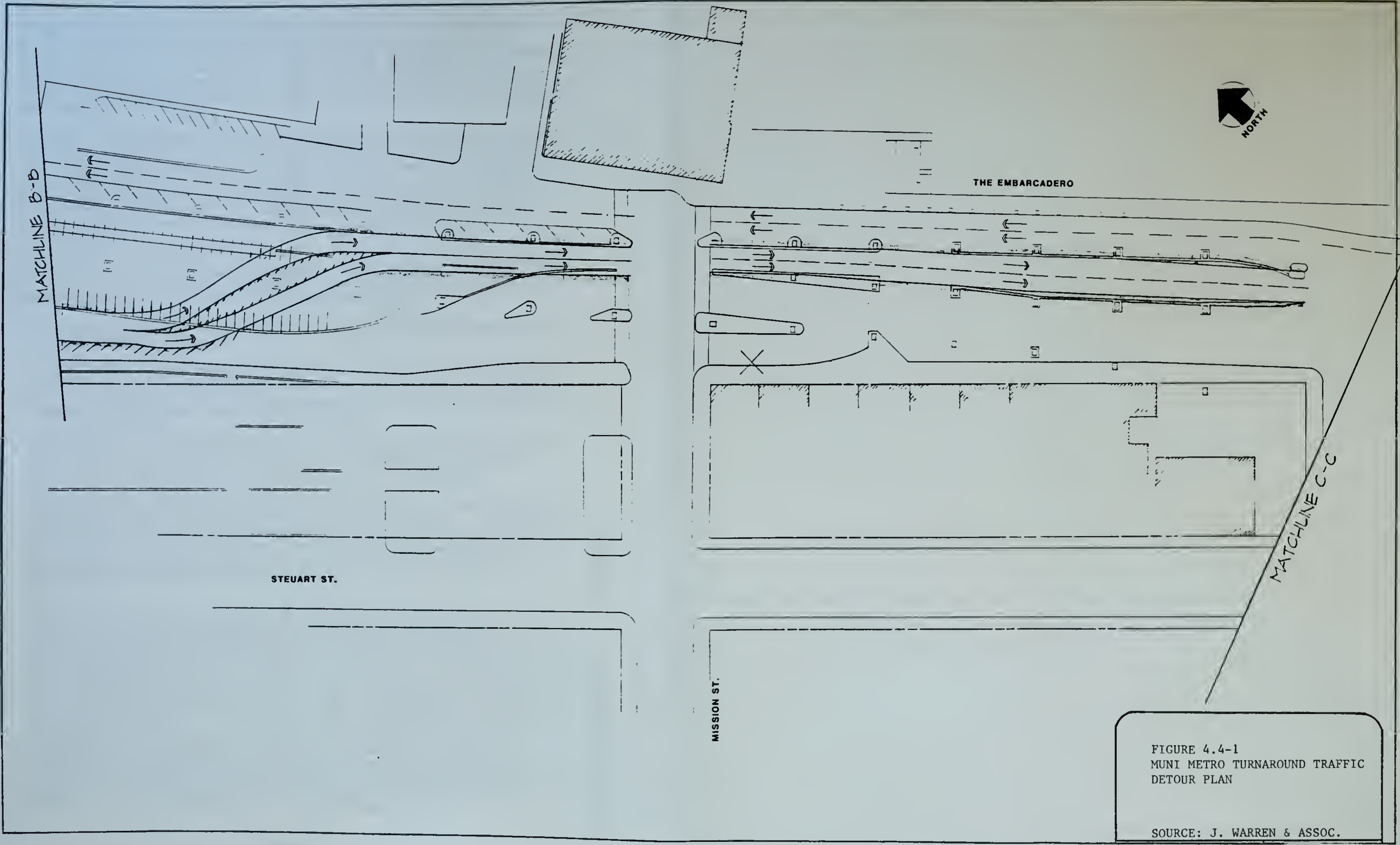

MATCHLINE B-B
THE EMBARCADERO
NORTH
STEUART ST.
MISSION ST.
MATCHLINE C-C

FIGURE 4.4-1
MUNI METRO TURNAROUND TRAFFIC DETOUR PLAN

SOURCE: J. WARREN & ASSOC.

Since major street circulation patterns and capacity would be maintained throughout construction, no major rerouting of MUNI lines would occur, although southbound bus stops on The Embarcadero at Mission and Howard may be affected and need to be temporarily discontinued or relocated. Tunnel excavation would disrupt use of the current MUNI bus turnaround at Mission and Steuart Streets and would require rewiring of the portion of the turnaround unaffected by construction.

LONG TERM. In the Surface Alternative, MUNI Metro would operate on surface tracks in the median of the new Embarcadero Parkway from the north side of Howard Street to the north side of realigned Bryant Street. The turnback of trains would occur on the surface at two locations; on a single side track between Howard and Folsom Streets, and on one of two side tracks between Harrison and Bryant Streets. This surface location for turning trains is the principal physical difference between the two build alternatives.

The location of the surface tracks and the turnaround operation would require modifications to the existing traffic plans. These modifications, along with analysis and recommendations, are described in Attachment "B" of Reference Document No. 9 and are refined in Reference Document No. 5.

This alternative would affect the layout and traffic at four intersections of the proposed Embarcadero Parkway:

Howard Street. The proposed Metro tracks would reach surface level prior to Howard Street. The visibility of approaching trains exiting the portal would be limited and, to reduce the potential for conflicts with autos, the median at Howard Street would need to be closed.

Folsom Street. Folsom would remain an eastbound one way street with both right and left turns allowed onto the Embarcadero Parkway. The median would be open across the MUNI tracks for this left turn movement.

Harrison Street. The median at Harrison Street would be closed because the slow speed of trains reversing direction would block traffic. In addition, a northbound left turn lane in The Embarcadero would not be possible due to the restricted right-of-way width. The closed median would impact Port operations by restricting access to and from Piers 24/26 and Fire Department operations by restricting access to and from the fire station on Pier 24 1/2.

Bryant Street. There are a number of redevelopment proposals in the vicinity of Bryant and Main Streets. The existing low intensity uses are expected to be replaced by multilevel structures, and the facilities on the currently unused Pier 30/32 are planned to be rebuilt. It is desirable to rationalize the movements to and from the pier and enable consolidation of the redevelopment sites by constructing a new intersection and road segment to replace both Bryant Street and Main Street intersections. The new intersection would require turning bays, which could only be provided south of the turnback because of the available roadway width. The turning bays would dictate locating the new intersection south of the existing intersection. The implications of this intersection alignment on access to Pier 30/32 are currently being studied by the Port of San Francisco. However, it is anticipated that a redistribution of traffic would reduce the Level of Service from A to C as shown in Table 4.4-1.

Coordinated traffic signals are proposed for all intersections in the Embarcadero Parkway project. In addition, the signals at Folsom and Bryant (when the southern extension is operational) must be integrated with Metro operations.

The expected future (year 2000) traffic volumes at the intersections along The Embarcadero in the project area were estimated based on existing volumes, which were adjusted to account for the median closings at Howard and Harrison, and then were increased by a factor of 20 percent to account for expected general traffic growth. Additionally, the P.M. peak traffic related to the redevelopment of Pier 30/32 was incorporated based on estimates of daily trip patterns provided by the Port of San Francisco. The projected year 2000 P.M. peak hour turning volumes are shown in Figure 4.4-2; the Level of Service anticipated due to traffic growth with and without Port development at Pier 30/32 and MUNI Metro surface turnback operation is presented in Table 4.4-1.

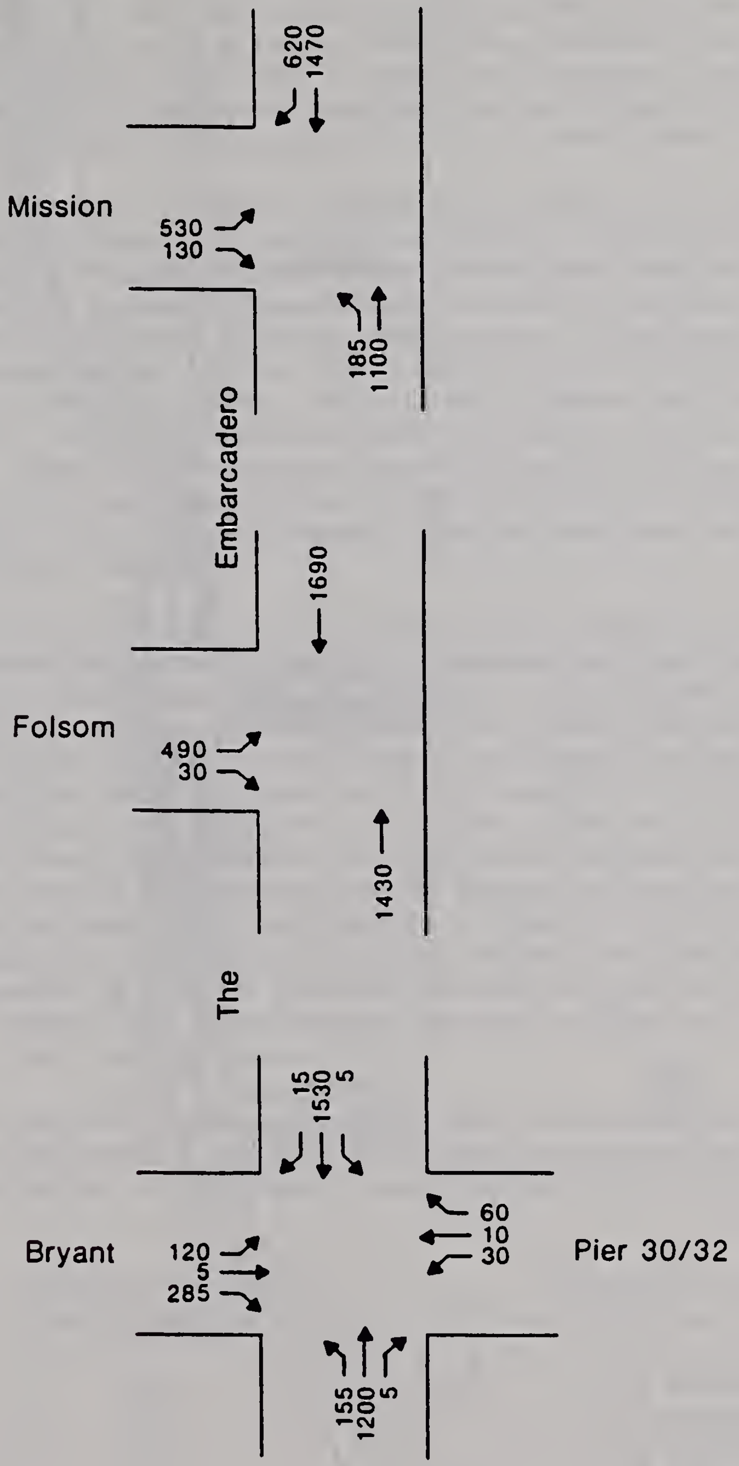
TABLE 4.4-1. PROJECTED YEAR 2000 LEVEL OF SERVICE ALONG THE EMBARCADERO

	DUE TO TRAFFIC GROWTH WITHOUT TURNAROUND		DUE TO TRAFFIC GROWTH, INCREASED ACTIVITY AT PIER 30/32, AND MUNI METRO SURFACE OPERATION WITH SURFACE TURNAROUND	
INTERSECTION	V/C	LOS	V/C	LOS
Embarcadero/Mission	1.05	F	1.25	F
Embarcadero/Folsom	0.76	C	0.89	D
Embarcadero/Bryant	0.56	A	0.70	C

Source: DKS Associates, 1986.

Table 4.4-1 indicates that growth in traffic is anticipated to deteriorate traffic conditions at Embarcadero/Mission to Level of Service F. The stop and go conditions could cause serious travel delays, particularly given the possibility of additional Port-related traffic and the closure of the Embarcadero/Howard and Embarcadero/Harrison intersections to left turning traffic as required in the Surface Alternative. Because the Surface Alternative would require these intersection closings, most of the redirected traffic would be forced onto Mission Street. This impact would significantly degrade traffic operations on Mission Street. The extent of queuing resulting from the Surface Alternative with preempted signalization in favor of MUNI Metro is shown in Figure 4.4-3.

Mission Street is designated a Transit Preferential Street in the City's Master Plan and is one of the most heavily utilized transit streets in the downtown, second only to Market Street. The projected traffic overload at the Mission/Embarcadero intersection would likely extend west on Mission Street to

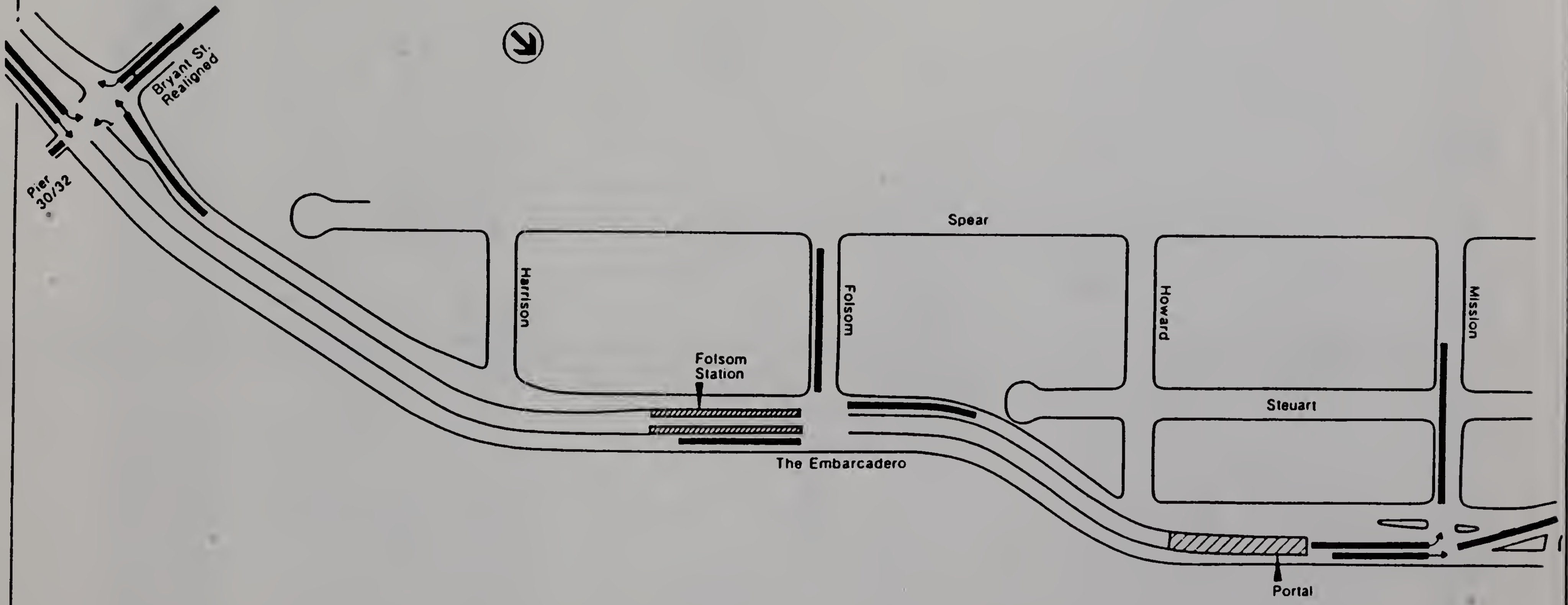


620
1470
Mission
530
130
185
1100
Embarcadero
1690
Folsom
490
30
1430
The
15
1530
5
Bryant
120
5
285
60
10
30
Pier 30/32
155
1200
5

SOURCE: DKS ASSOCIATES

FIGURE 4.4-2
YEAR 2000 DESIGN VOLUME
P.M. PEAK HOUR

SOURCE: DKS ASSOCIATES


Bryant St. Realigned
Pier 30/32
Harrison
Folsom Station
Folsom
Spear
Howard
Mission
Steuart
The Embarcadero
Portal

30 trains per hour at Folsom
20 trains per hour at Bryant

FIGURE 4.4-3
MAXIMUM QUEUING WITH FULL PRIORITY

other intersections. Traffic impacts on Mission Street would adversely impact not only MUNI bus operations but Samtrans and Golden Gate Transit's service as well. The resulting traffic queues would significantly interfere with access to the Mission Street High Occupancy Vehicle lanes as well as interfering with access to MUNI terminals on Steuart and at Transbay Terminal. Due to the projected growth of traffic by the year 2000, the Mission/Embarcadero intersection will be overloaded with either alternative. However, the traffic redistribution due to the Surface Alternative would increase this overload by nearly 20 percent. The traffic impacts on Mission Street related to the Surface Alternative, therefore, would be significant and unmitigated.

Similarly, Embarcadero/Harrison and Embarcadero/Bryant could also be expected to have diminished Levels of Service. At Harrison Street, closing the median to turning vehicular traffic would restrict truck access from Harrison to Pier 24/26. Access would have to be accomplished by turning south on Main Street, west at Bryant Street and then north onto The Embarcadero. Southbound trucks on The Embarcadero desiring access to Pier 24/26 would need to follow a similar route or make a U-turn at Bryant. Additionally, since left turns are not permitted at Harrison, a block-long northbound left turn queue is anticipated at Bryant. However, the reduced Levels of Service, from C to D at Folsom Street and from A to C at Howard Street, would still allow traffic flow without excessive delays, i.e., over 40 seconds. Drivers may have to wait through more than one signal change.

Both the Embarcadero Parkway traffic and the Metro surface operation will affect pedestrian movements between the Bayfront Promenade and new Rincon Point park and the rapidly developing area to the west. The Embarcadero/Howard intersection would be realigned to allow pedestrians to cross The Embarcadero only on the south side of Howard Street, at least 200 feet from the tunnel portal to provide sight distance for rail operators. Although pedestrians would be directed away from track switches, there will still be three sets of tracks to cross, with signals and pedestrian separation devices. The transit median width in the two blocks between Howard and Harrison Streets is identical for the two alternatives, and therefore does not create any differences for the pedestrian crossings at Howard, Folsom, and Harrison Streets. The transit median is widened between Harrison and Bryant Streets to accommodate additional tracks, but this widening does not affect the pedestrian crossings at the intersections.

Train operations on the Surface Alternative MUNI tracks in the median of the new Embarcadero Parkway will affect the time available for pedestrians to cross the tracks in the median. This impact is a function of the train frequency as follows:

Street Crossing	Trains per Hour per Direction	Available Crossing Time per Hour
Howard	30	30 minutes
Folsom	18	42 minutes
Harrison	18	42 minutes
Bryant	12	48 minutes

The time available for crossings at Bryant Street is similar to current surface routes and does not restrict pedestrian movements. At the most restrictive location at Howard Street, train frequency will require flashing light signals. However, sufficient time is available.

Proposed Metro operations of 30 trains per peak hour per direction is defined in Chapter 1. The capacity and reliability of this Metro operation on the surface will be impacted by the crossing of traffic at Folsom Street and of pedestrians at every intersection.

Mitigation

SHORT TERM. In order to mitigate construction related impediments to circulation in the project area, the following mitigation measures are proposed:

- Through traffic movements along The Embarcadero should be maintained during construction as indicated in Figure 4.4-1. Intersections along the cut and cover excavation in the Embarcadero Roadway should be covered (decked) temporarily to allow vehicle and pedestrian circulation to the activities along the waterfront. Specifically, decking of the Mission Street/Embarcadero intersection would provide access to the Agriculture Building and the Bayfront Promenade. Access across The Embarcadero at Howard should also be provided.

- Continued access to the buildings along the east side of The Embarcadero between Mission and Howard Streets, particularly for pedestrians and emergency vehicles, should be provided. Additionally, a temporary, substitute turnaround loop for MUNI buses using the portion of the existing turnaround facility at Mission and Steuart Streets not used for construction needs to be installed. Interim facilities for operator layovers should be relocated to outbound terminals. No alternative routes would be required since temporary detours and decking of excavated areas will allow maintenance of basic traffic circulation patterns and capacity.

LONG TERM. The following traffic diversions are proposed:

- The realignment of The Embarcadero at Folsom would result in increased demand for left turns into Howard and Mission, because direct access to Steuart would no longer be possible from Folsom. This demand of left turns from Folsom into Steuart Street was projected to be as large as 120 vehicles per hour in the P.M. peak hour. Since Howard Street would be closed at Embarcadero to left turning traffic, traffic would be diverted to Mission Street. The Embarcadero at Mission Street would require two turn lanes instead of one to accommodate the additional left turning vehicles. However, the intersection would be at capacity during the peak period, and the resulting LOS F could not be mitigated.

- The projected evening peak hour volume (25 vehicles per hour) of left turn movements from The Embarcadero to Harrison Street could be readily accommodated at Bryant Street. The left turn from Harrison Street is projected to be 75 vehicles/hour in year 2000. This traffic could be diverted to Folsom Street without significant impact on that street.

- Restricted access to and from Piers 24/26 will be mitigated by diverting traffic south to Bryant or north to Mission for u-turns.

- Restricted access to and from the fire station on Pier 24 1/2 will be mitigated by providing a crossing of the MUNI tracks immediately in front of the station.

Analysis has shown that good traffic coordination can be provided for auto traffic along The Embarcadero while providing full priority for MUNI Metro. This coordination can be achieved by using modern microprocessor controllers with vehicle loop detectors and density control (senses presence and numbers of cars), to ensure flexible and efficient use of the green time. This arrangement would be satisfactory with 30 trains per hour per direction at Folsom Street and would reduce the possibility of excessive queuing and delays.

To reduce the number of trains passing the intersections of Folsom and Harrison Streets, a maximum number of trains would be reversed between Howard and Folsom Streets. Prior to operation of the MUNI Metro Extension, at least half of the trains would be turned back on this track.

Metro train speed between Howard and Bryant would be reduced to ten mph to minimize possible accidents with cars and pedestrians. Pedestrian access to the Waterfront at Howard and Bryant would be retained. Road closures for emergency vehicles would be provided to compensate for median closures at Howard and Harrison Streets.

Pedestrian crossings of the Embarcadero Parkway would be controlled by walk signals at each intersection. A crossing would be provided immediately in front of Pier 24 1/2 to provide access to the fire station located on the pier. Independent crossing of the MUNI tracks would be controlled by standard transit/railroad flashing lights and bell activated by an approaching train. The preemption analysis at Folsom Street indicated that an adequate pedestrian crossing phase would be available for independent crossings of the traffic lanes and MUNI Metro tracks. Operations simulation at the new Folsom Street intersection, where signal preemption for Metro trains is proposed, indicates that an average of 18 seconds will be available for crossing in every 80 second cycle.

Because of the traffic, access, and circulation impacts, the capacity and reliability of Surface Metro operation will be jeopardized, particularly by cross traffic at Folsom Street and by pedestrians at every intersection. The anticipated delay to Metro service and risk of accident under the Surface Alternative could not be adequately mitigated.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The impacts of the Underground Alternative are similar to those of the Surface Alternative except as noted below.

The longer area of cut and cover construction will extend through the Howard Street/Embarcadero intersection. This will require a short term closure until decking is installed. Since the surface portion of the trackbed terminates short of the intersection of Steuart and Folsom Streets, the impacts to traffic flow on Steuart Street will be confined to a segment of approximately one block.

In the Underground Alternative, 141 Port parking spaces would be displaced for a longer period of time, 40 months, because of the larger cut and cover excavation area and time required for subway construction.

LONG TERM. In this alternative, the only surface Metro operation would be non-scheduled movement of disabled vehicles across Folsom Street at slow speed to a temporary holding track. After the Extension is opened, scheduled trains would operate at approximately five minute headways. Because no traffic impacts are associated with this alternative, year 2000 traffic projections for The Embarcadero would be the same as without the Turnaround Project (see Table 4.4-1). With minimal traffic/Metro vehicle conflict, risk of MUNI-related accidents would be less than under the Surface Alternative. The Underground Alternative would also allow Howard and Harrison Streets to remain open at Embarcadero, thus eliminating the need for a dual left turn lane at Mission Street. The right-of-way requirements along The Embarcadero for the Underground Alternative are less than the requirements for the Surface Alternative allowing greater width for sidewalks and the median strip between Harrison and Bryant Streets.

Mitigation

SHORT TERM. Mitigation measures for the Underground Alternative are the same as in Alternative 1. The longer cut and cover section through Howard Street will require additional decking of the Howard/Embarcadero intersection in this alternative. However, the Underground Alternative does not extend as far south as Alternative 1 and, therefore, will have somewhat less traffic related impacts south of Howard Street.

LONG TERM. None required.

TSM AND NO ACTION ALTERNATIVES

Impacts

SHORT TERM. None.

LONG TERM. The existing turnaround facility will not be able to accommodate sufficient levels of service to meet projected peak demand. As a result, increased numbers of auto trips may occur in downtown San Francisco, resulting in greater congestion, decreased levels of service, and increased, localized air pollution.

4.5 URBAN DESIGN

4.5.1 INTRODUCTION

The urban design impact and mitigation analysis examines the project alternatives relative to the aesthetic and functional relationship between the waterfront and the inland city side of the project area. This evaluation draws on subjects addressed in greater detail in other sections of this report. These subjects which are brought together in the urban design section include transit operations, pedestrian and vehicular circulation, views, land use compatibility, construction impacts, parklands and historical resources. These issues are inherent in various related waterfront studies, plans and development program goals such as the Northeastern Waterfront Plan, I-280 Transfer Concept EIR, the ongoing Embarcadero Roadway Urban Design Study and the MUNI Metro Turnaround Embarcadero Urban Design Study (see Reference Document No. 5).

This analysis focuses on the urban design issues associated with the Turnaround Project. The overall plans for improvements to this segment of the waterfront include realigned roadways, public and private development projects, the new waterfront park, and other public amenities. The turnaround facility must be one integral element completing and supporting these waterfront improvements. To achieve this objective, four design guidelines were identified in the July 1987 MUNI Metro Turnaround Embarcadero Urban Design Study. These guidelines include: integrating all functions, enhancing the maritime traditions, promoting visual and physical access to the Bay and balancing the costs and benefits.

INTEGRATING ALL FUNCTIONS

All transportation, land use, and pedestrian functions must be well integrated to ensure an efficient, attractive, and safe design and operations. Train service must be frequent and reliable to ensure patronage. Pedestrians and autos should move easily along and across The Embarcadero; major intersections should facilitate traffic. The landscaping should harmoniously link the area's multiple functions. In addition, the streets, commercial areas, and open spaces should function as a unified area that contributes to the economic vitality of the waterfront.

ENHANCING MARITIME TRADITIONS

Public sentiment and State and Federal laws have stressed the importance of maritime activity along San Francisco's waterfront. The Embarcadero has always been the confluence of maritime/railroad/commercial activity. Transportation systems and land use can enhance the remaining maritime activities and reinforce the maritime traditions of the area. Light rail transit vehicles would return the color and movement of the freight trains that were an important element of The Embarcadero prior to the 1960s. In addition, the historical and maritime traditions could be enhanced by the use of The Embarcadero light standard and bollard and cable barriers.

PROMOTING VISUAL AND PHYSICAL ACCESS TO THE BAY

The San Francisco waterfront has been studied extensively by a wide range of interests — from developers to environmentalists. A major concern to all is preserving and promoting visual and physical access to the Bay. Views can be preserved by carefully aligning streets, trackways and intersections, and by minimizing the height and bulk of building structures. Utilitarian elements and street furniture should be organized to enhance views and access, rather than function as barriers.

BALANCING COSTS AND BENEFITS

A well-designed Embarcadero Roadway, with light rail transit, would foster not only a lively urban environment, but also a healthy one. It would create new opportunities for maritime, commercial, light industrial, and housing developments. In other cities, such as Portland, Oregon, modest public investments in well-designed facilities have induced larger expenditures of private development money. The area within the Turnaround Project study area is already experiencing an expansion of private development land use changes, including Hills Plaza and Rincon Center. Public expenditures to improve The Embarcadero would, therefore, encourage other well-designed developments.

Generally, the most significant element which has an adverse urban design impact on the northern portion of the project area is the Embarcadero Freeway. The freeway overshadows the character and scale of many buildings along the waterfront, including buildings in the East Street Row and the Ferry Building complex. The Embarcadero Freeway also obstructs views and isolates the waterfront from the rest of the city.

Certain design elements of the Turnaround Project could have an urban design impact. The primary elements include barriers, pedestrian control systems, lighting, utility equipment, and the portal and ventilation structures. Potential impacts can be reduced through appropriate mitigation measures which could allow the turnback facility to function more efficiently and safely in conjunction with the Embarcadero Roadway. The mitigations will help ensure that the transportation, land, and pedestrian uses are well integrated and that San Francisco has a lively urban environment along its waterfront.

Both the Surface and Underground Alternatives will be designed to minimize view blockages. The two alternatives, however, do vary in impact on waterfront views and access as described in the impact discussion of the alternatives.

Design treatments suggested for mitigation of the Turnaround impacts should be consistent with the Urban Design Guidelines for the Embarcadero Roadway Project (San Francisco Department of Public Works, 1988).

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction activity would disrupt pedestrian and vehicular access to the waterfront in the project area. Some views would be temporarily blocked by construction equipment and activity. The potential visual impact associated with the presence of construction equipment and activity would perhaps be greatest when lunchtime crowds are gathering in Justin Herman Plaza and along the Bayfront Promenade.

LONG TERM

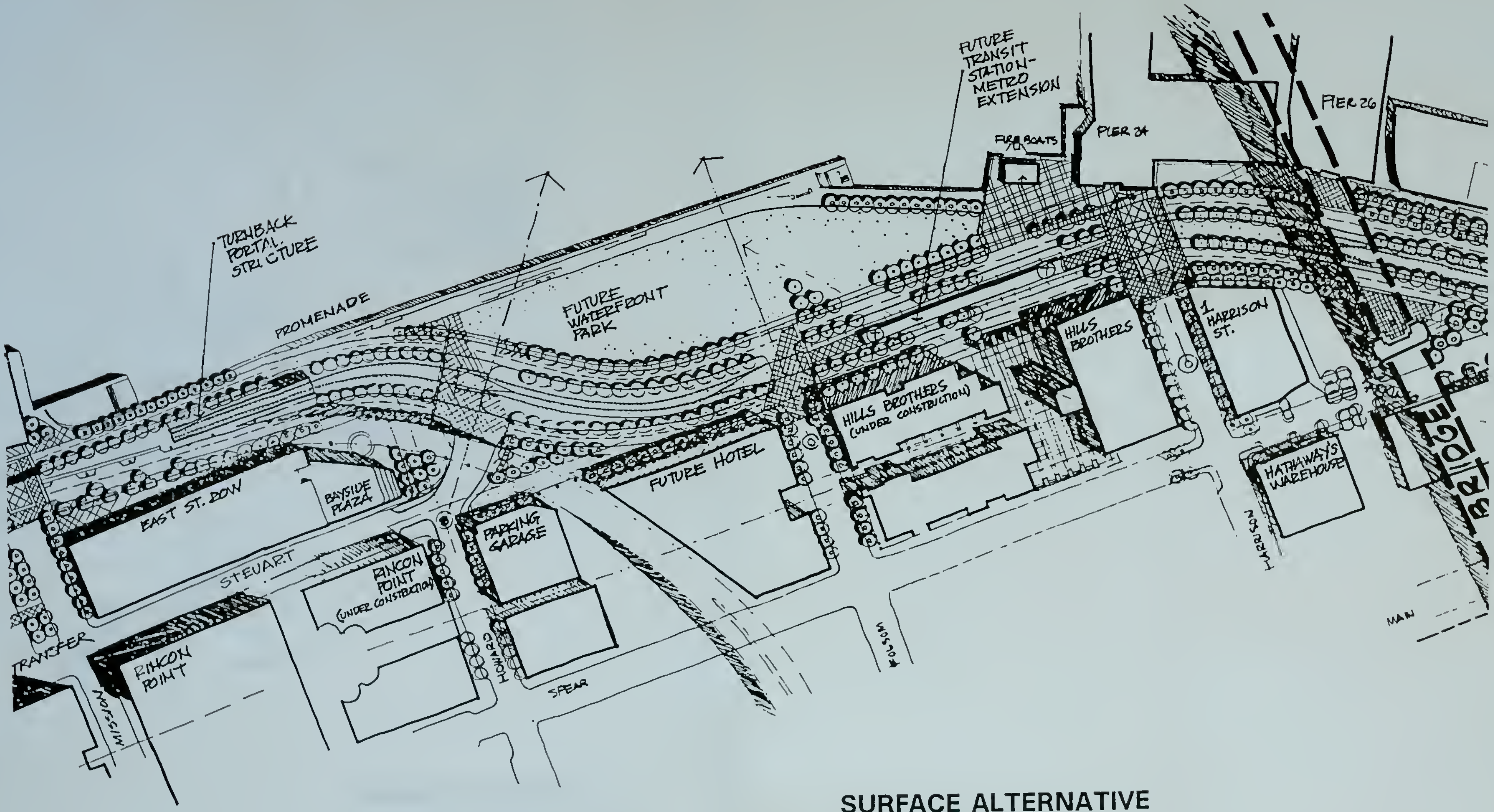
Operations: The peak-hour operating plan for the Surface Alternative, described in Section 2.3, Definition of Alternatives, includes turning back six J trains on the center pocket track between Howard and Folsom; 12 K, L and M trains on the middle tracks between Harrison and Bryant; and 12 trains continuing through to the future Metro Extension. This operating plan requires average peak-hour headways of 2 to 2.5 minutes per direction over the pedestrian crossings at Howard, Folsom, and Harrison Streets, and a turnback operation on two side tracks between Harrison and Bryant Streets. The headways create conflicts with pedestrians crossing at these intersections.

There is also a potential barrier effect associated with train movements at these frequencies. Train movements in the Embarcadero Roadway median between the waterfront and high-density land use developments to the west conflict with development programs and policies which promote increasing physical access to the waterfront.

The frequency of train operations between Bryant and Howard will impact views between the waterfront and intersecting streets to the Embarcadero Roadway as well as adjoining land uses such as the Hills Plaza development. Direct views from the plaza level of the Hills Plaza development to the waterfront will be potentially affected most by the future MUNI Metro Station which is a part of the future Metro extension project. These impacts will be examined as a part of the Embarcadero Roadway environmental analysis. Other related analyses have been carried out as a part of the Embarcadero Urban Design Study, December 1988. The work scope for the Embarcadero Urban Design Study included an examination of visual and pedestrian issues associated with the Embarcadero Roadway alternatives.

Temporary location of light rail vehicles in the turnback track areas will block waterfront views during periods of turnback operations (see Figure 4.5-1). Overhead wiring required for the revenue and nonrevenue tracks will be visible from adjoining areas.

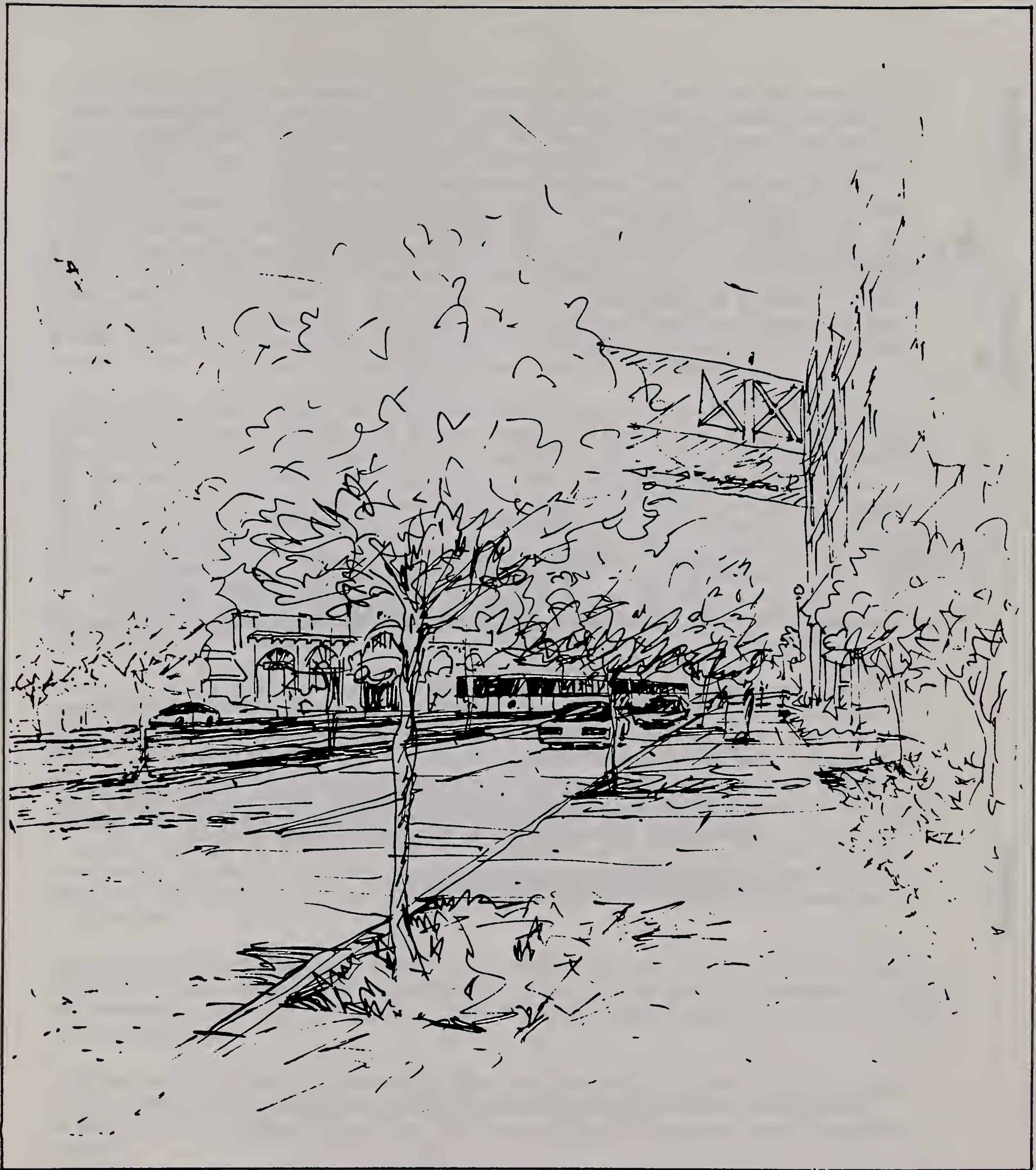
The mainline track and the two turnback tracks require a wider median between Harrison and Bryant Streets (see Figures 4.5-2 and 4.5-3). The Surface Alternative establishes a broader roadway in comparison with the Underground Alternative only between Bryant and Harrison. The Surface Alternative does create conflicts between train operations and pedestrian access and views to and from the waterfront in comparison to the Underground Alternative. The roadway would


TURNBACK PORTAL STRUCTURE
PROMENADE
FUTURE WATERFRONT PARK
FUTURE TRANSIT STATION-METRO EXTENSION
FIRE BOATS
PIER 24
PIER 26
HILLS BROTHERS
1 HARRISON ST.
HILLS BROTHERS (UNDER CONSTRUCTION)
FUTURE HOTEL
EAST ST. ROW
BAYSIDE PLAZA
PARKING GARAGE
RINCON POINT (UNDER CONSTRUCTION)
STEUART
TRANSFER
RINCON POINT
MISSION
HOWARD
SPEAR
FOLSOM
HARRISON
HATHAWAYS WAREHOUSE
MAIN
BRIDGE

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround
Urban Design Study 7/87

FIGURE 4.5-1



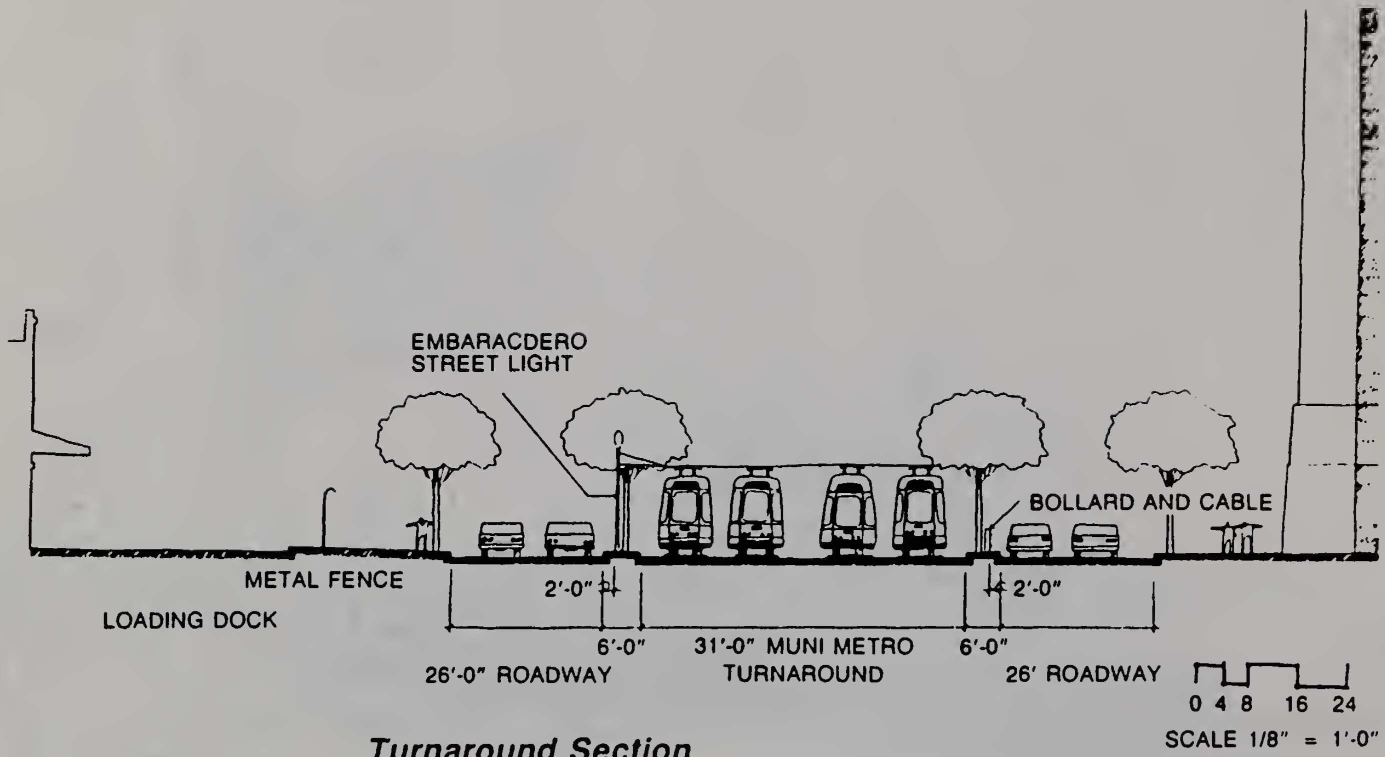
SURFACE ALTERNATIVE

VIEW LOOKING SOUTHEAST FROM HARRISON AND THE EMBARCADERO TOWARDS PIER 28. TURNAROUND TRACK SHOWN IN THE MEDIAN OF THE EMBARCADERO PARKWAY.

SOURCE:

E. M. Rose and Associates

FIGURE 4.5-2


EMBARACDERO
STREET LIGHT
BOLLARD AND CABLE
METAL FENCE
LOADING DOCK
2'-0"
2'-0"
6'-0"
31'-0" MUNI METRO
TURNAROUND
6'-0"
26'-0" ROADWAY
26' ROADWAY
0 4 8 16 24
SCALE 1/8" = 1'-0"

Turnaround Section

These two sections — one at the turnaround near the Bay Bridge pylon and Pier 26, and the other through the train station platform at Hills Plaza — show critical dimensions and relationships as they relate to design elements.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero
Urban Design Study 7/87

FIGURE 4.5-3

be narrower under the Underground Alternative only between Bryant and Harrison, a one-block section, because of the location of a turnback track in this block in the Surface Alternative. See the Urban Design Impacts discussion, Section 4.5, for a discussion of the differences in pedestrian waterfront access between the Surface and Underground Alternatives. The median for turnback operations will restrict vehicular access to The Embarcadero from Howard and Harrison to southbound lanes only. From Folsom, access will be to northbound and southbound Embarcadero Roadway lanes. The Surface Alternative would require relocation of the Belt Line Railway into an adjoining traffic lane from Bryant Street to the portal structure near Howard Street. This relocation of the Belt Line Railway onto a traffic lane from Bryant to the portal structure provides for the option of maintaining Belt Line trackage north of Market Street if required by the Port of San Francisco.

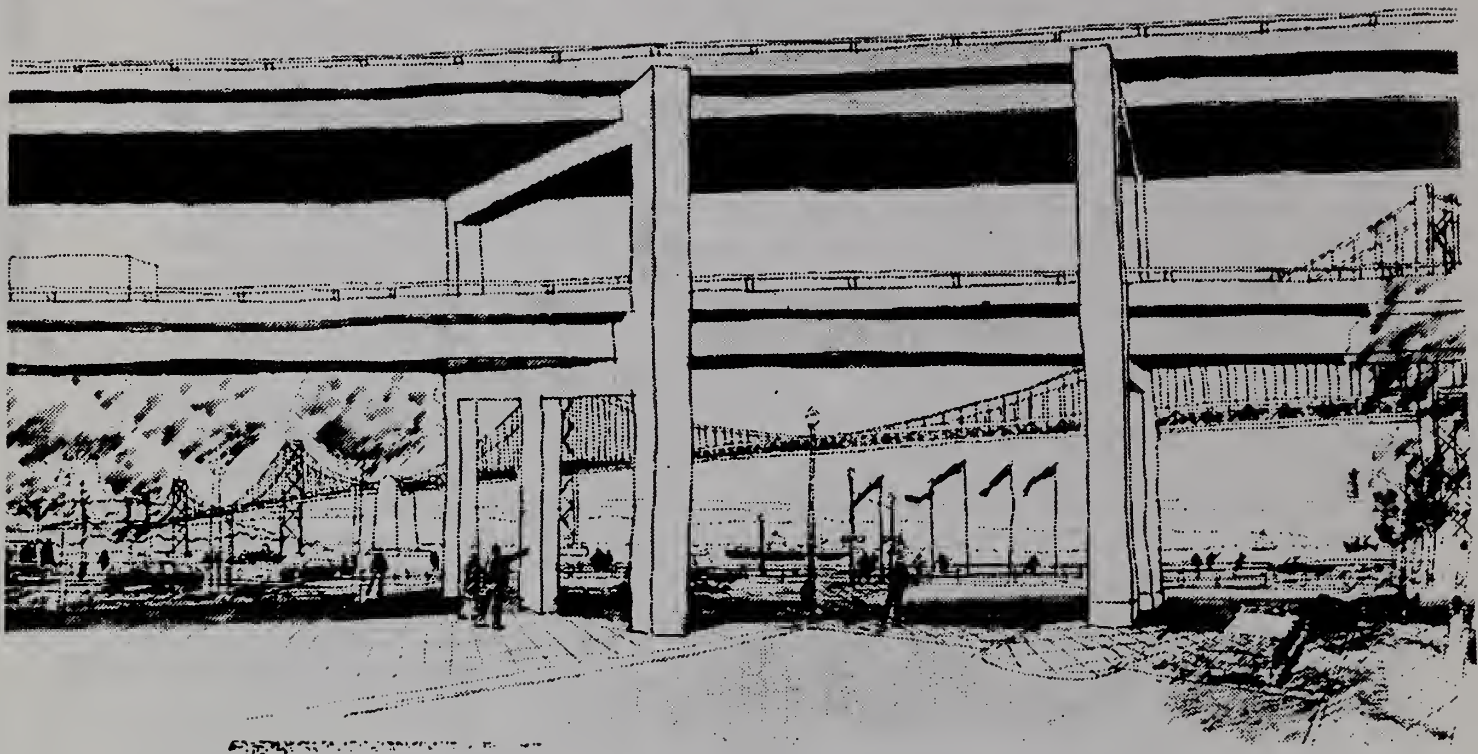
Additionally, realignment of the Howard and Bryant Streets intersections would be required. The Howard Street intersection will be realigned to allow pedestrians to cross the roadway and track at a distance sufficiently away (approximately 200 feet) from the portal entry and provide a visual link to the waterfront from the Steuart/Howard Street intersection (see Figures 4.5-4 and 4.5-5). The crosswalk directs pedestrians away from track switches located south of the crosswalk (see Figure 4.5-5). Realignment of the Bryant Street intersection would be required because of the additional length needed for the turnback tracks between Harrison and Bryant Streets (see Figure 4.5-6). This intersection, however, was previously planned to be realigned to accommodate vehicular access to Pier 30-32.

Barriers: Pedestrian areas must be separated from those areas used for the turnback operation. The remote-controlled track switches in the pavement which divert trains between tracks are exposed and must be kept away from pedestrian traffic. Different types of barriers to prevent pedestrians from entering track and switch areas were considered, such as four-foot chain link fence covered with vines or shrubs. However, these are usually unsightly because of the trash and papers that get blown into them. They also create a visual barrier to the Bay. Barrier designs are further evaluated in the Embarcadero Roadway Urban Design Study (Department of Public Works, 1988). Barrier requirements and design alternatives have not been established by MUNI as yet.

Pedestrian Control System: Peak-hour headways require that a system be used to prevent pedestrians from crossing the track in the path of oncoming trains. The pedestrian control system must be effective without adding a visual barrier to the landscape.

Lighting and Utilitarian Elements: The various poles, signs, signals, and lights needed for pedestrian, train, and auto traffic control can result in clutter and confusion that can be disorienting along this urban waterfront segment.

Portal: The portal is a long, rectangular opening where trains come up to grade. It will have parapet walls on three sides; the deepest end will be 18 feet deep. It will be located under the end sections of the elevated Embarcadero Freeway, near the old alignment of Howard Street. Locating the portal here will keep it physically and visually associated with the freeway.



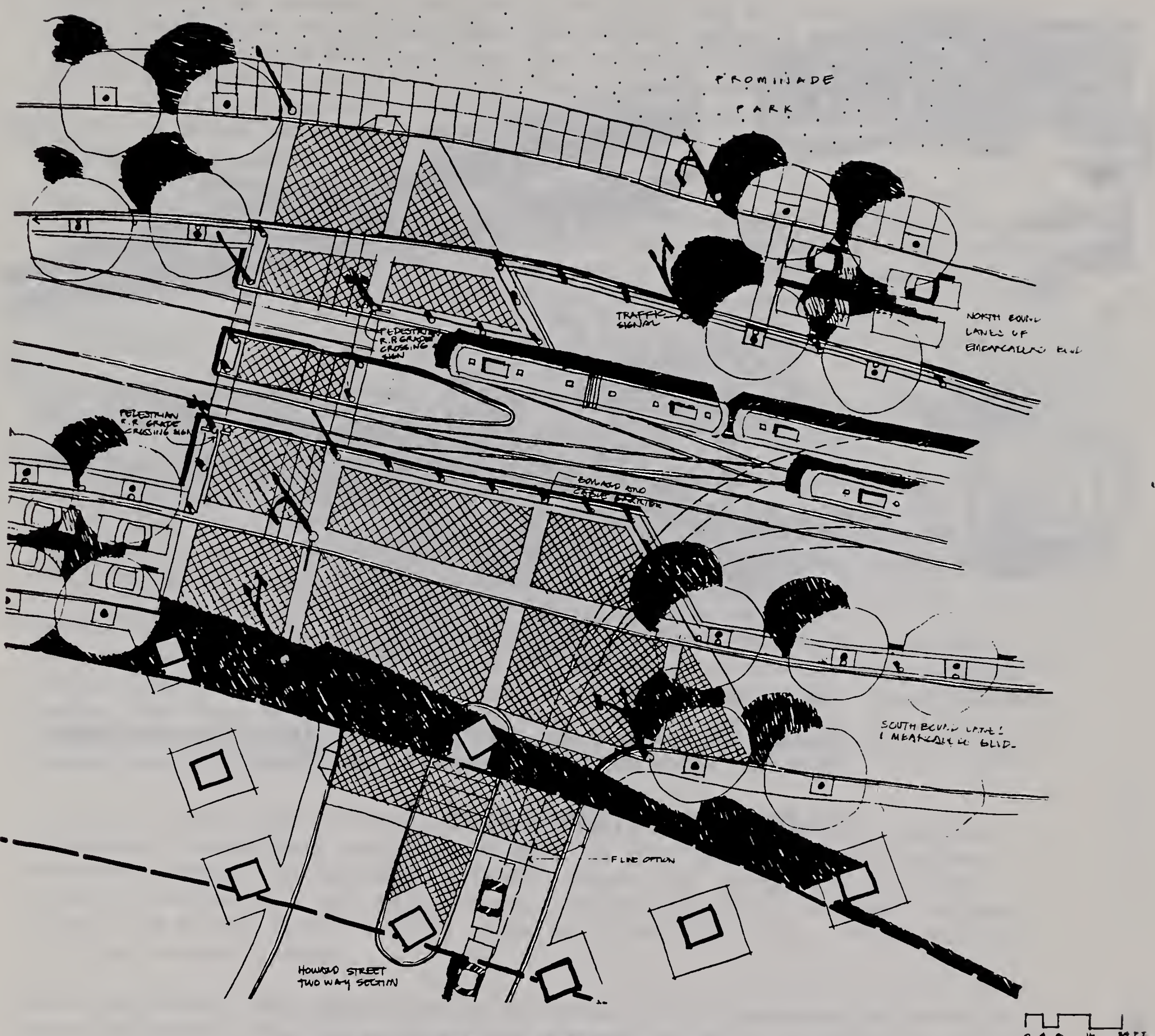
Howard Street

Realignment of Howard Street toward the promenade park beyond The Embarcadero Boulevard.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero Urban Design Study 7/87

FIGURE 4.5-4


PROMINADE PARK
TRAFFIC SIGNAL
NORTH BOUND LANES OF EMBARCADERO BLVD
PEDESTRIAN R.R GRADE CROSSING SIGN
PEDESTRIAN R.R GRADE CROSSING SIGN
BOLLARD AND CABLE BARRIER
SOUTH BOUND LANES OF EMBARCADERO BLVD.
F LINE OPTION
HOWARD STREET TWO WAY SECTION
0 4 8 16 24 FT
SCALE 1/8"=1'-0"

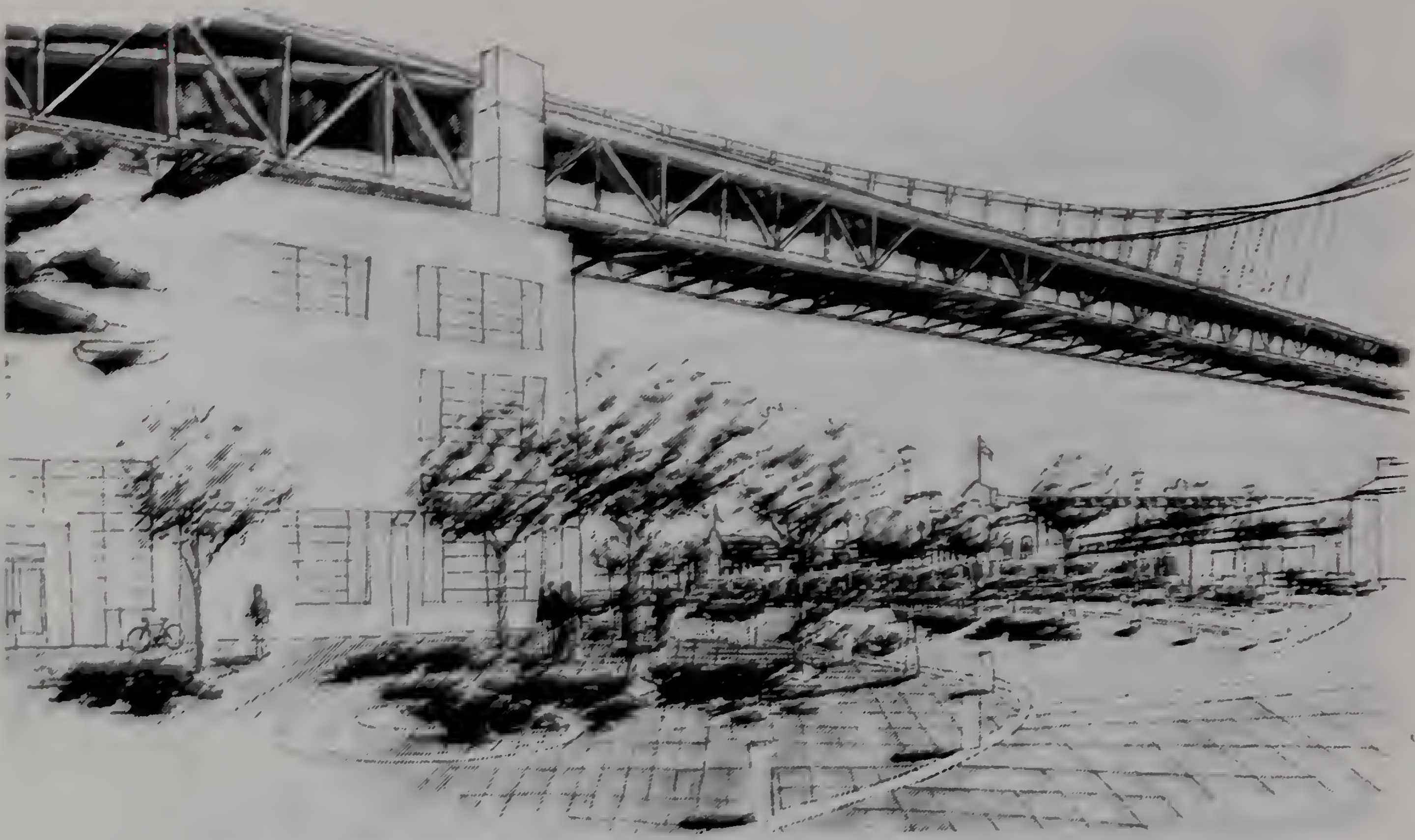
Howard Street Intersection Plan

Enlarged view of Howard Street showing street lighting, bollard and cable barriers, and paving patterns.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero Urban Design Study 7/87

FIGURE 4.5-5



Bryant Street

Standing in Bryant Street, this sketch shows the Muni Metro turnaround facilities at Piers 24 and 26 and the new plaza at 2 Bryant Street.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero
Urban Design Study 7/87

FIGURE 4.5-6

Pedestrian areas nearest to the portal are along the Bayfront Promenade and the sidewalk along East Street Row. The parapet walls of the portal should not block views from the East Street Row to the waterfront. The portal, including overhead wires, could contribute further to the adverse impact which the freeway has on the character of East Street Row buildings. The Surface Alternative would interfere with access to the waterfront by users of the YMCA.

Ventilation Structures: The subway, from the MUNI Embarcadero Station to the portal, must have ventilation structures for air exchange. Their location and appearance adjacent to the southern end of Justin Herman Plaza near the trolley bus turnaround could have a visual impact on the park.

Mitigation

SHORT TERM. There are no mitigation measures identified for the short-term visual impact associated with the viewing of construction equipment and activity.

LONG TERM. Operations: Minimize pedestrian conflicts at crossings by changing the Operating Plan, if proven feasible, to include turning back 12 K, L and M trains on the center pocket track between Howard and Folsom Streets; six J trains on one of the side tracks between Harrison and Bryant Streets; and utilize the other side track for temporary storage of disabled trains.

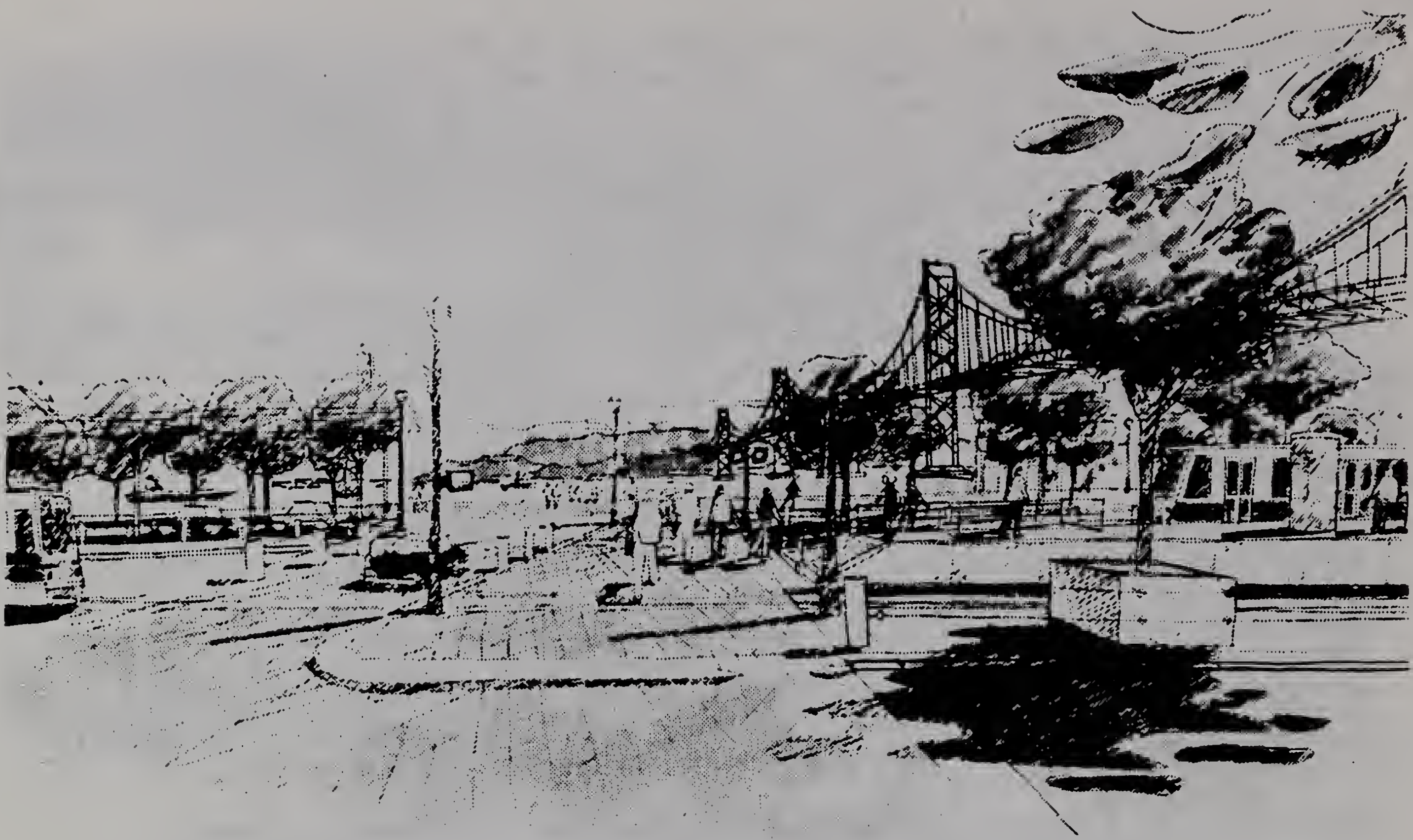
This proposed change in the Operating Plan increases the average headway in each direction at the Folsom and Harrison Street crossings to 3.3 minutes during peak periods and five minutes during non-peak periods. These headways reduce the level of pedestrian conflicts and are comparable to two cities nationally (Cleveland, Ohio and Pittsburgh, Pennsylvania) with major transit operations in mixed traffic.

Barriers: Use nautical bollards with cables to separate pedestrians from turnaround operations. Use bollards 3-1/2 to four feet high, with cables attached by means of specially detailed rings. The setup will not block views of the Bay and will maintain the open character of the area. Figure 4.5-6, the Bryant Street sketch, shows how this system could be integrated into the overall design.

Both the Surface and Underground Alternatives will be designed to minimize view blockages. The two alternatives, however, do vary in impact on waterfront views and access as described in the impact discussion of the alternatives.

Pedestrian Control Systems: Prevent pedestrians from crossing the path of oncoming trains by use of an audio/visual signal which is superior to a gate. Use twin, large black circles with red flashing lights and warning bells. This simple, traditional signal alerts pedestrians to oncoming trains, but does not block views of the Bay. Mount the circles on poles that match the light fixtures along The Embarcadero. (See Figure 4.5-7, Folsom Street sketch.)

Lighting and Utilitarian Elements: Minimize visual clutter and confusion due to a non-coordinated use of poles, signs, signals, and lights. Use the light fixtures now installed along the park promenade as the boulevard light



Folsom Street Intersection Plan

Enlarged view of Folsom Street showing typical design elements and the north end of the train station platform. The Folsom Street Plan is similar to the Bryant Street intersection.

SURFACE ALTERNATIVE

SOURCE: **Muni Metro Turnaround Embarcadero**
Urban Design Study 7/87

FIGURE 4.5-7

fixture. They can be modified to accept the electrical wire supports for the trains, the traffic control signals, and the pedestrian crosswalk signals (see Figure 4.5-8). Street signs can be incorporated as well, but directional and warning signs should appear on separate, complementary poles. The Folsom Street sketch shows how all these elements could be integrated to avoid clutter and protect view corridors of the Bay and the bulkhead buildings.

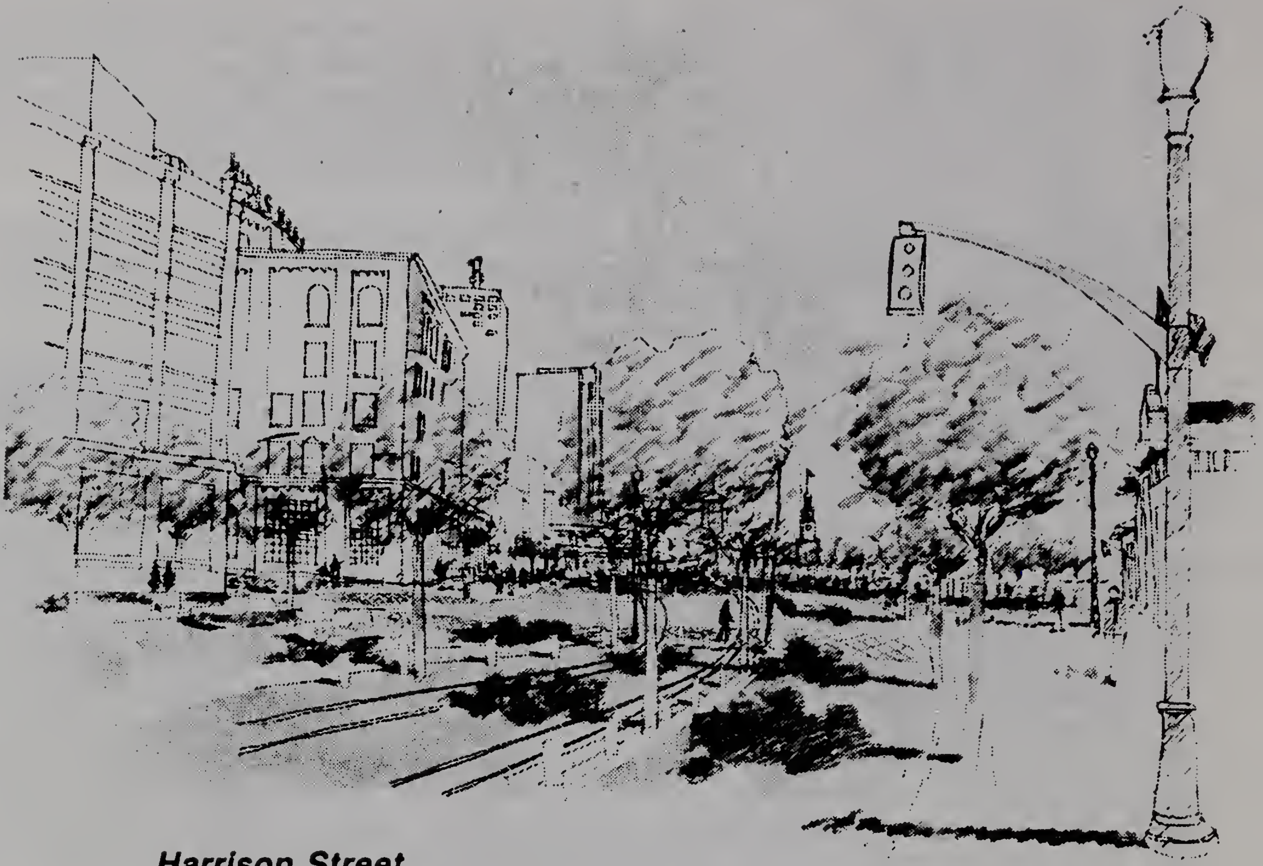
Materials: The bollards should be nautical in character. Precast concrete is an economical choice for the bollards and will give them a substantial quality similar to stone. The cable should also be substantial and could be stainless steel.

The Metro track bed would be paved in typical asphaltic concrete (AC) along the boulevard stretches. AC is a more flexible material than concrete, which can crack from the heavy, repetitive train loads and the vibrations. AC can contrast, and therefore demark, non-pedestrian areas, such as track beds and auto pavement. Brick pavers or other high quality and durable materials should be used for pedestrian crosswalk areas. The pavers should be used to guide pedestrians in desired directions away from surface track switches (see Figure 4.5-8). The mid-block crossing at Hills Plaza should be paved to function as an extension of the Plaza paving at the base of the Hills Brothers tower. The area would then join Hills Plaza, Bayfront Promenade, and adjacent maritime structures. The median should be lined with trees. Tree planting along the median would help to screen overhead wires and would provide a sense of continuity along this segment of the waterfront. See MUNI Metro Turnaround Embarcadero Roadway Urban Design Study (Reference Document No. 11) for an overall treatment of street trees in the project area in conjunction with the Embarcadero Roadway improvements.

Portal: The portal structure should be plain and simple in overall configuration, similar to the concrete columns and deck of the elevated freeway. Thus, it becomes part of the freeway structure. The walls should be low to minimize the potential for view blockage and enveloped in ivy, similar to the freeway. The fence on the parapet should be a simple decorative steel fence (see Figure 4.5-9).

The portal structure for the Surface Alternative can be designed to minimize visual obstruction to and from the waterfront. The portal structure, however, will impact pedestrian access to and from the waterfront along the East Street Row. The Underground Alternative is the City's preferred alternative because it does more closely conform to the Northeastern Waterfront Plan's emphasis on increased visual and physical access to the waterfront and on other City plans and programs for the waterfront.

Ventilation Structures: The location and appearance of the ventilation structures should be carefully considered. When the Embarcadero Roadway is realigned, a new area will open up for design near the bus turnaround and Justin Herman Plaza. The ventilation structures could be located somewhere in this area and used as a sculptural element. Rather than constructing plain, utilitarian ventilation structures, there is an opportunity to design ventilation structures that complement the Plaza.



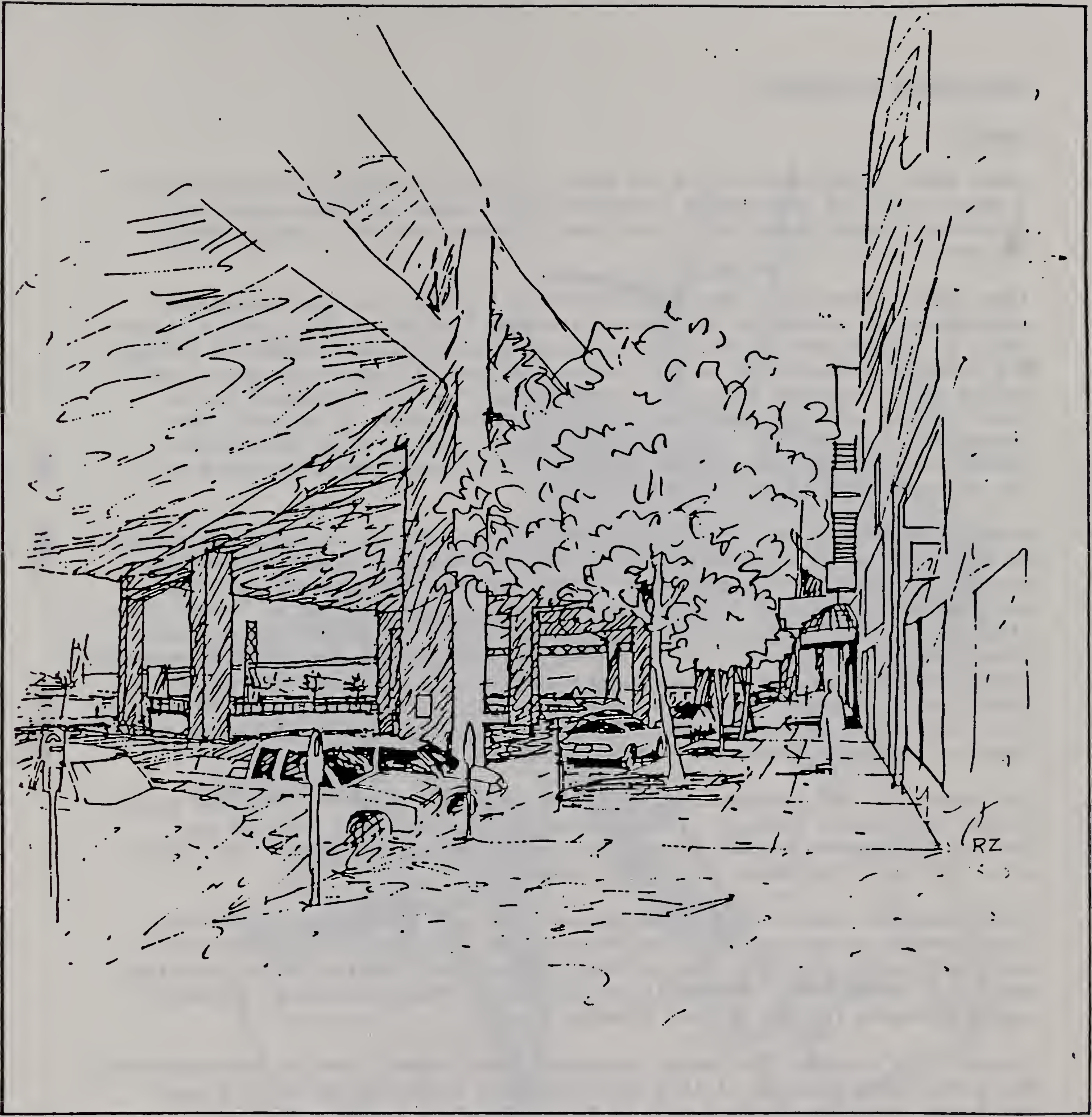
Harrison Street

Standing beyond Pier 24 and the fire station looking north at the Hills Plaza train station with the Ferry Building as a landmark in the background and the Hills Plaza project to the left.

SURFACE ALTERNATIVE

SOURCE: Muni Metro Turnaround Embarcadero Urban Design Study 7/87

FIGURE 4.5-8



SURFACE ALTERNATIVE

VIEW LOOKING SOUTH TOWARDS WATERFRONT FROM EAST STREET ROW. TURNAROUND PORTAL LOCATED BELOW EMBARCADERO FREEWAY.

SOURCE:

E. M. Rose and Associates

FIGURE 4.5-9

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. These impacts are the same as those identified for Alternative 1 except that the underground construction is longer and more extensive. Therefore, these impacts will occur over a larger area for a longer period of construction.

LONG TERM. Operations: The peak-hour operating plan for the Underground Alternative is similar to Alternative 1 except that all J, K, L, and M trains would be turned back on the two underground pocket tracks. Temporary storage for disabled trains would be provided on the surface between the portal and Folsom Street. In the area west of the surface track for disabled trains, views to the waterfront would be blocked when this track is in use. The overhead wiring for this track would be viewed from the area west of this track. Intermittent obstruction of views to the waterfront associated with the movement of disabled trains would occur.

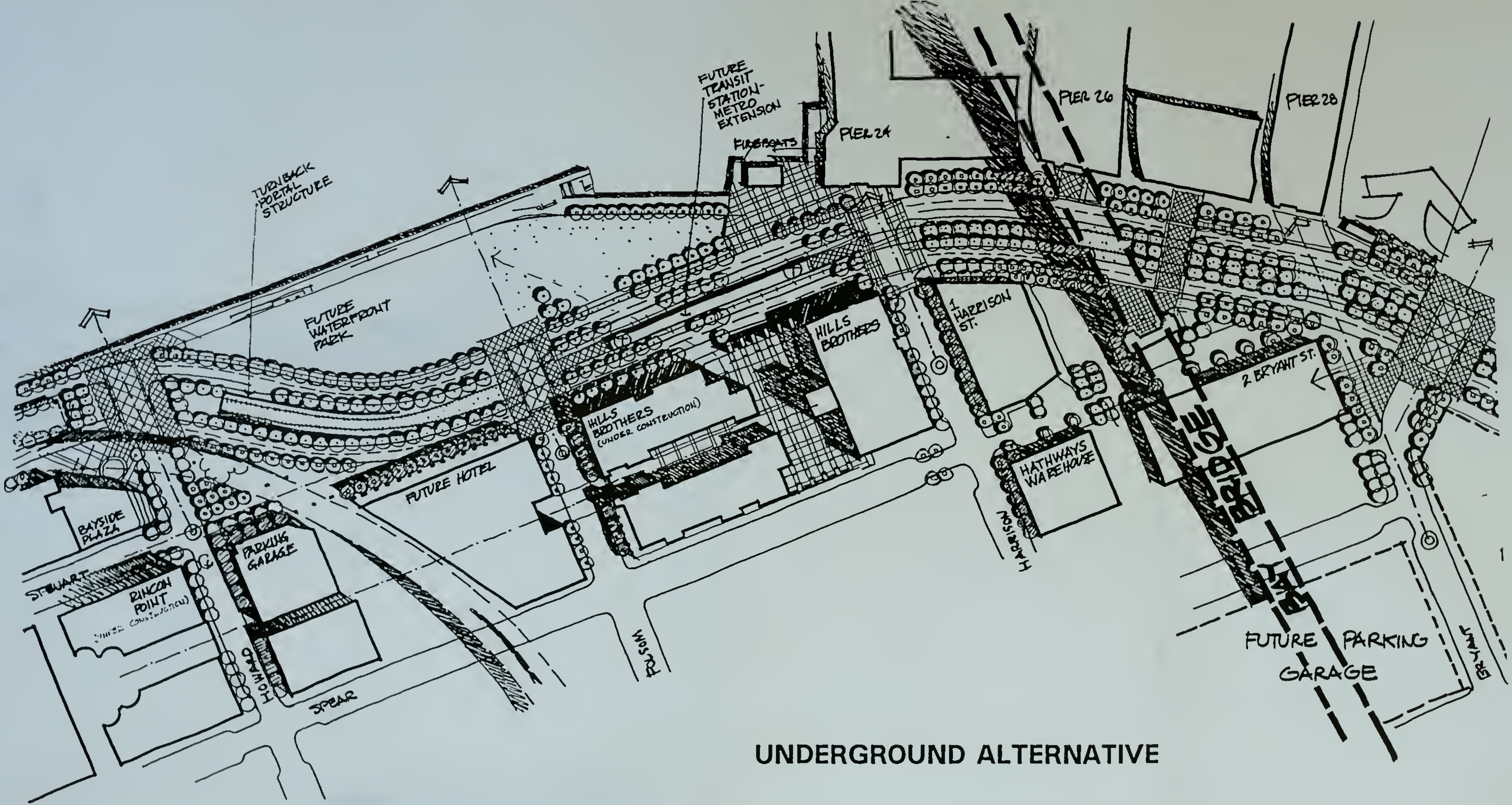
However, because turnback operations would have virtually no impact on pedestrian access or views to the waterfront, there is no potential future conflict between the limited train operation and development programs and policies which promote increasing physical access to the waterfront and an intensification of office and residential developments west of the Embarcadero Roadway (see Figures 4.5-10 and 4.5-11). The Underground Alternative would accommodate improved pedestrian and vehicular access to future development of Port facilities within the project area. A primary purpose of the Underground Alternative is to facilitate pedestrian access to the waterfront and to minimize potential impact of turnback operations on view corridors.

The median for the Underground Alternative would not restrict vehicular access to the Embarcadero Roadway. This alternative requires less right of way for the Embarcadero Roadway between Harrison and Bryant Streets. This would allow for wider sidewalks along this segment.

Since turnback operations are underground, barriers separating pedestrians from turnback operations would not be required. Special pedestrian control systems to avoid conflicts due to train headways and pedestrians at crossings would not be required. Minimal lighting, poles, signs and signal equipment would be needed for the surface disabled track.

Portal: The walls of the portal structure could impact views to the waterfront. The portal area would be visible from the upper floors of the Hills Plaza and future hotel development west of the Embarcadero Roadway, and should be designed to complement the adjacent park and inland development.

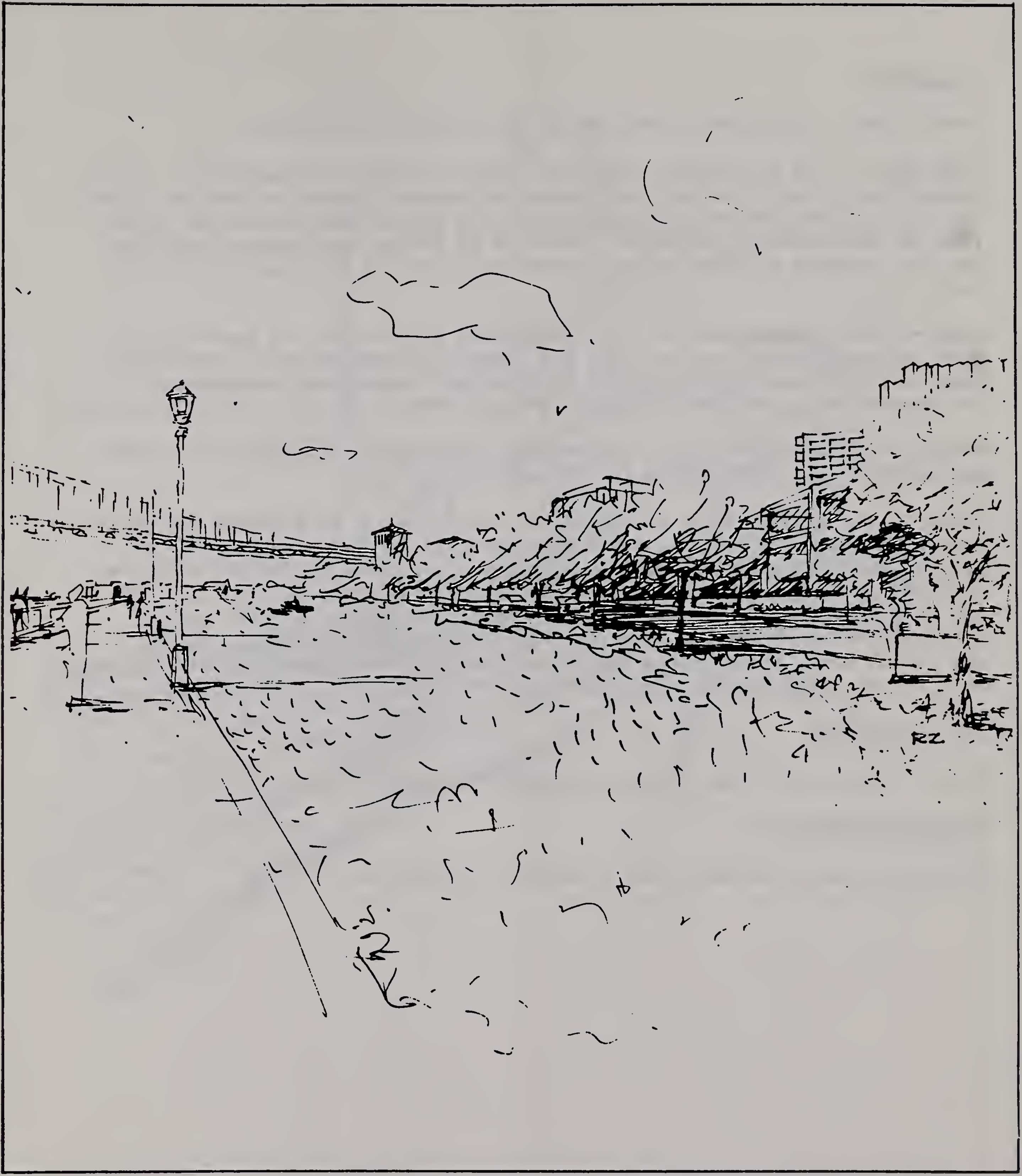
Ventilation Structures: These structures could have the same impact as under the Surface Alternative.


TURNBACK PORTAL STRUCTURE
FUTURE WATERFRONT PARK
FUTURE TRANSIT STATION-METRO EXTENSION
FIREBOATS
PIER 24
PIER 26
PIER 28
HILLS BROTHERS
HILLS BROTHERS (UNDER CONSTRUCTION)
1 HARRISON ST.
HATHWAYS WAREHOUSE
2 BRYANT ST.
BRIDGE
FUTURE HOTEL
BAYSIDE PLAZA
PARKING GARAGE
STEUART
RINCON POINT (UNDER CONSTRUCTION)
HOWARD
SPEAR
FOLSOM
HARRISON
FUTURE PARKING GARAGE
BRYANT

UNDERGROUND ALTERNATIVE

SOURCE: Embarcadero Parkway
Urban Design Study 8/88

FIGURE 4.5-10



UNDERGROUND ALTERNATIVE

VIEW FROM PROMENADE LOOKING SOUTH AT WATERFRONT PARK. TURNAROUND PORTAL IS WEST OF THE EMBARCADERO PARKWAY WITH HILLS PLAZA TOWER AND BAY BRIDGE IN BACKGROUND.

SOURCE:

E. M. Rose and Associates

FIGURE 4.5-11

Mitigation

SHORT TERM. Mitigation is the same as the Surface Alternative.

LONG TERM. This alternative would not require mitigation measures for train operations, related barriers and pedestrian control systems or various lighting and utilitarian elements. Mitigation for the ventilation structures is the same as the Surface Alternative. There is no mitigation measure identified for the blockage of views during periods in which the disabled track is in use.

Right-of-way requirements for the Underground Alternative are generally less than for the Surface Alternative. For example, between Harrison and Bryant Streets the Turnaround Underground Alternative right-of-way requirements are approximately 18 feet less than the requirements for the Surface Alternative.

Materials: Materials used for pedestrian crossings, trees lining the median and bollards are as described for Alternative 1.

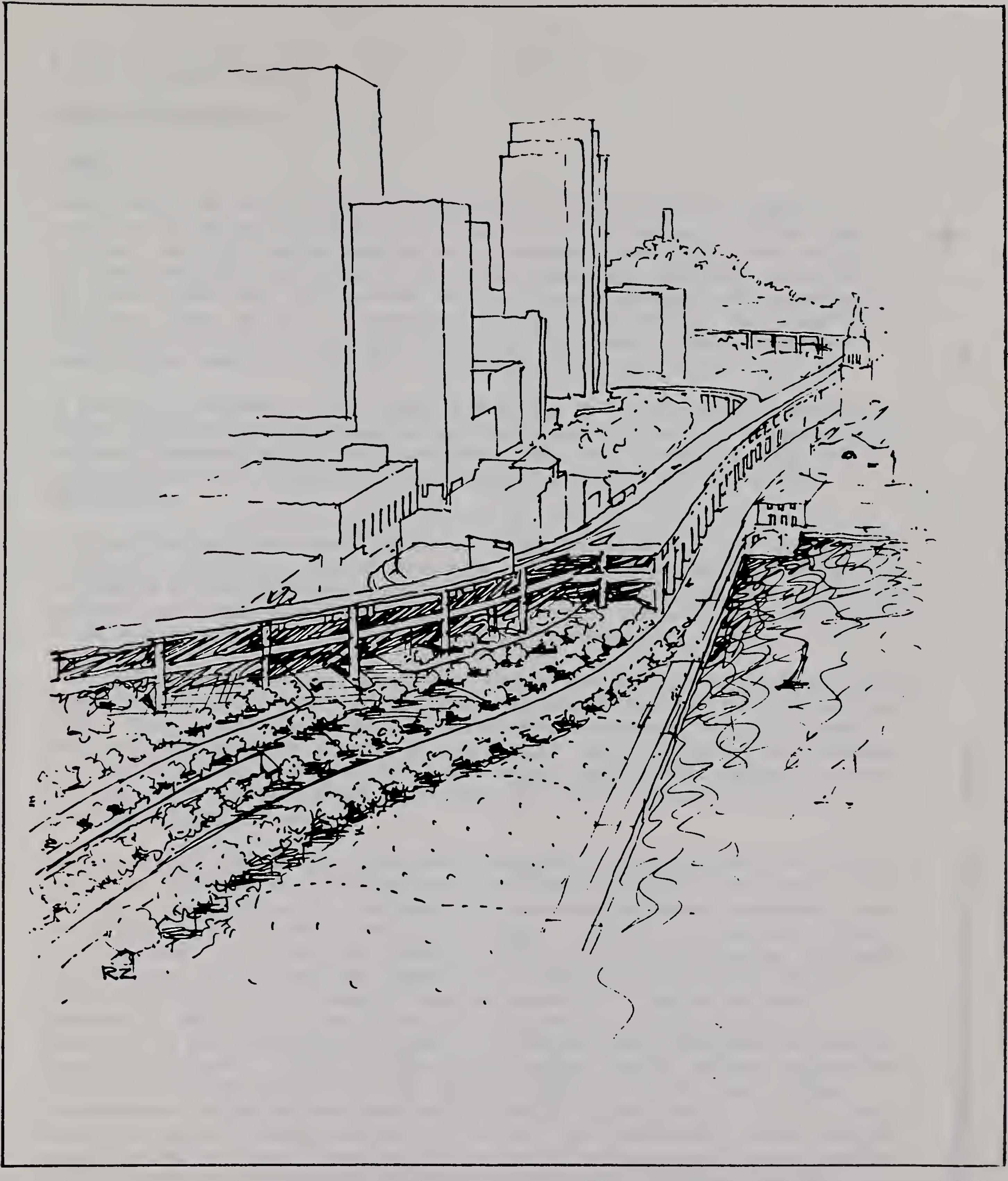
Portal: The parapet walls of the portal should be low to minimize the potential view blockage. Glass block should be considered for the parapet walls to give a sense of transparency. A decorative steel fence consistent with the wall design should be considered. Alternative treatment for the wall includes use of a decorative all-steel fence to minimize potential for the portal structure to block views. Tree planting along the median in the area of the portal would aid in screening views from the upper floors of developments west of the Embarcadero Roadway (see Figure 4.5-12).

TSM ALTERNATIVE

There is no urban design impact under this alternative.

NO-BUILD ALTERNATIVE

There is no urban design impact under this alternative.



UNDERGROUND ALTERNATIVE

BIRD'S-EYE VIEW FROM WATERFRONT LOOKING NORTH AT PORTAL AREA. WATERFRONT PARK IN FOREGROUND AND EMBARCADERO FREEWAY AND CITY IN BACKGROUND.

SOURCE:

E. M. Rose and Associates

FIGURE 4.5-12

4.6 AIR QUALITY

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The most important temporary air quality impact related to construction activities is increased particulate emissions. Earthmoving, drilling, and soil redistribution activities associated with construction of the transportation facilities would create temporary, localized increases in TSP (total suspended particulates) and particulate matter whose diameter is 10 microns or less (PM 10). As stated in the Existing Setting, no violations have occurred since 1985 in the City of San Francisco. These localized construction impacts could occur throughout the Project Area.

Of particular concern is the proposed drilling that will occur in Justin Herman Plaza and the subsequent excavation under the Plaza. The users of the Bayfront Promenade must also be protected from the increased particulate emissions due to the excavation and transportation of soil along The Embarcadero.

Construction activities also result in pollutant emissions from the operation of gasoline and diesel powered equipment. CO and NOx emissions would be the pollutants of concern from the operation of construction equipment. It is not expected that these emissions would be significant nor would they create local violations of air quality standards for this alternative.

LONG TERM. The operational impacts of this transportation alternative include slight reductions in local air pollutant emissions such as total organic gases (TOG), NOx, particulates, and CO. Transportation related emissions would decrease slightly under this build alternative, owing to projected increased peak period ridership on the MUNI Metro system and the concommitant reduced auto use. The overall effect on regional air quality would be a minor beneficial impact as well.

Using the year 2000 design volume P.M. peak hour traffic figures from Section 4.4 of the DEIS and the existing peak hour traffic figures from Section 3.6 of the DEIS, contributions to localized CO concentrations were calculated using the CALINE4 line dispersion modeling program. The model parameters include the following: (1) stability class F; (2) wind speed of 0.5 meter per second; (3) 10 degree Celsius ambient temperature; (4) EMFAC7D California emission factors corresponding to average vehicle speeds of 15 mph along the Embarcadero and 10 mph along cross streets; and (5) an ambient one hour CO level of 8.3 parts per million (ppm) for the year 2000 (Bay Area Air Quality Management District, 1985). To obtain the eight hour CO traffic concentration contributions resulting from local traffic levels, the one hour traffic concentration contributions were multiplied by 0.7 and added to the projected eight hour ambient concentration of 5.3 ppm. Thus the total carbon monoxide concentration at street level is the sum of the concentration due to vehicle emissions and the background concentration. Table 4.6-1 shows both the existing CO concentrations and the projected CO concentrations due to traffic growth, increased activity at Pier 30/32 and MUNI Metro surface operation.

TABLE 4.6-1. PROJECTED YEAR 2000 TOTAL CONCENTRATIONS FOR CARBON MONOXIDE

STREET	CROSS STREET	EXISTING CO 8 HOUR	(PPM) (a) CO 1 HOUR	PROJECTED CO 8 HOUR	(PPM) (a) CO 1 HOUR
Embarcadero	Mission	14.6	20.8	12.6	18.2
Embarcadero	Folsom	9.8	14.0	9.9	14.1

(a) Includes background concentrations.

Source: Earth Metrics Incorporated, 1988.

Under the worst case traffic conditions for Year 2000 (growth plus the Surface Alternative operation), the Embarcadero/Mission intersection would deteriorate to Level of Service F. Northbound traffic on The Embarcadero turning left onto Mission could be expected to queue. Although the left turning traffic may slow to an average of five mph during the peak hour, the projected peak hour CO concentrations would decrease because vehicle emission rates, as well as background CO levels, are expected to be reduced. The peak hour CO levels at the Folsom/Embarcadero intersection would remain relatively constant through Year 2000 since reduced vehicle emissions would be offset by the anticipated sharp deterioration in the Level of Service (from B to D) at this intersection. The eight hour State standard of nine ppm would still be violated at both intersections.

Mitigation

SHORT TERM. The suggested mitigation measures are limited to construction phases and intended to reduce localized increases in total suspended particulate emissions (BAAQMD, "Dust Control Required Measures" (1983). These supplementary City requirements are listed in the Building Code.

Trucks should be kept off dirt areas and should be kept on paved or graveled roads to the extent possible to minimize road dust. In addition, spray bars should be used at construction area access points to wash wheels and undercarriages of trucks (if permitted by the San Francisco Water Department due to current concerns about drought conditions). If water cannot be sprayed due to drought conditions, dust palliatives should be applied in construction areas to control fugitive dust. Dump truck loads should be covered with canvas or tarps when hauling excavated material of fill to control dust; and paved areas should be vacuum sweeped in a manner that does not entrain excessive dust.

LONG TERM. The decrease in projected emissions of pollutants caused by the implementation of this build alternative results in a beneficial impact that becomes quantitatively insignificant at the county level. Mitigation measures intended to reduce local concentrations of pollutants, therefore, are not required. However, the design of this alternative should be coordinated with the Embarcadero Roadway realignment project in order to prevent localized emission increases during peak periods from queuing automobile traffic due to surface operation of the transit vehicles. Proposed signal priority for MUNI Metro vehicles at the Folsom/Embarcadero intersection should also allow sufficient time for auto movements to reduce vehicular delays. However, the State eight hour CO standard would be violated at Folsom/Embarcadero in spite of the mitigations employed.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. As with the Surface Alternative, the most important temporary air quality impact would be increased particulate emissions as a result of construction activity. Although this alternative does not have the large extent of surface track that exists in Alternative 1, this alternative does have a greater amount of underground area in the cut and cover section. Consequently, more material has to be excavated and the resulting particulate emissions could impact the Bayfront Promenade and buildings along The Embarcadero more severely than construction of the Surface Alternative. Other short term air quality impacts are similar to these for Alternative 1.

LONG TERM. No long term impacts will occur. Local air pollutant concentrations potentially generated at The Embarcadero/Folsom intersection in Alternative 1 will not occur in this alternative, since train movements across Folsom Street will be infrequent and the track used only for temporary storage of malfunctioning trains.

Mitigation

SHORT TERM. The suggested mitigation measures, presented under Alternative 1, are intended to reduce localized increases in particulate emissions.

LONG TERM. No long term mitigation measures are required.

TRANSPORTATION SYSTEMS ALTERNATIVE AND NO ACTION ALTERNATIVE

Impacts

SHORT TERM. Since both of these alternatives are no build alternatives, there would be no construction related air quality impacts.

LONG TERM. Although implementation of the no build alternatives would not impact local or regional emissions, they do not produce any beneficial air quality results as in Alternatives 1 and 2, since an opportunity to shift downtown trips from automobiles to transit is not provided.

4.7 NOISE

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction activities would increase noise levels on an intermittent basis along the transportation corridor alignment during the construction period. Typical construction equipment expected to be utilized during the construction of the proposed project and the related radiated noise levels are presented in Table 4.7-1. Sensitive receptors which could be affected by the construction noise without mitigation include the Justin Herman Plaza as well as residential projects at Hills Plaza. Haul trucks and delivery trucks would, on an intermittent basis, cause additional noise impacts along their routes to construction areas. Actual construction and truck traffic noise impacts would vary according to the duration and level of sound generated by specific operations.

LONG TERM. To approximately quantify the sound levels generated by turnback operations, measurements were taken at the J line terminus at Church and 30th Streets and at the West Portal Station at Ulloa Street and Portal Avenue. The measurement distance at both locations was 27 feet from the center line of MUNI Metro right-of-way. The measurements revealed that peak sound levels due to the train passbys were in the range of 76 to 90 dBA, and that sound levels due to operation of the switches were up to 90 dBA.

The American Public Transit Association (APTA) has published sound level guidelines in terms of the peak A-weighted levels. (Note: the A-weighted levels are sound levels as measured using the A-weighting sound level meter. This network is designed to correspond to the frequency response of the human ear.) For high density multi family dwellings and commercial receptors, the guideline level (or goal) identified by APTA is 80 dBA. These levels apply to nighttime operations and to receptors at a distance greater than 50 feet from the tracks. By reference to the measurement data, with adjustment to apply at a 60 foot reference distance, the peak levels from the turnaround operations are predicted to be 84 dBA. This level (for nighttime trains, 10:00 P.M. to 7:00 A.M.) is therefore in excess of the guideline value for "absolute" sound levels. However, note the discussion in the paragraph below regarding the evaluation of impacts in reference to existing ambient levels.

In terms of the increase in sound level over the existing ambient values, the Urban Mass Transportation Administration (UMTA, 1976) considers that increases of up to four dBA in Leq are not significant, provided local and State guidelines are not being exceeded. The San Francisco Noise Ordinance prohibits intruding noise to exceed the ambient noise levels by five dBA.

In the case of the Surface Alternative, sound levels will be amplified by reflections of train operating noise under a freeway. It is estimated that the sound levels could be momentarily increased by three or four dBA when source and receptor are both within 150 feet of the freeway. This effect would be primarily noticeable at the survey location near Howard Street and The Embarcadero. As a result, the equivalent energy level due to the trains could be increased by one to two dBA and the final resulting Leq from all sources increased by less than one dBA. This is not a significant impact according to the San Francisco Noise Ordinance.

TABLE 4.7-1. TYPICAL CONSTRUCTION EQUIPMENT NOISE BEFORE AND AFTER MITIGATION

EQUIPMENT	MITIGATION MEASURE	NOISE LEVEL (dBA) BEFORE	NOISE LEVEL (dBA) AFTER	DISTANCE (FEET)
Pile Driver	Muffler on exhaust and sound barrier the leads	103	95	25
Pavement Breaker	Muffled	105	100	3
Diesel Driven Electric Welder	Muffler plus acoustical enclosure	93	76	23
Air Compressor (Diesel Driven)	Muffled	105	85	3
Air Tracked Drill	Acoustical enclosure	104	83	23
Sinker Drill	Acoustical enclosure	95	78	15
Earth Movers				
Front loader	Muffler	79	75	50
Backhoe	Muffler	85	75	50
Dozer	Muffler	80	75	50
Grader	Muffler	85	75	50
Truck	Muffler	91	75	50
Paver	Muffler	89	80	50
Material Handlers				
Concrete mixer	Muffler	85	75	50
Crane	Muffler	83	75	50
Jack Hammer	Muffler or acoustical enclosure	88	75	50

Source: Urban Mass Transportation Administration, 1974; U.S. EPA, 1971.

At most of the noise survey locations, the predicted levels from surface train operations will be lower than the measured existing values. Accordingly the resulting total sound level, obtained by decibel addition, will exceed the existing level by less than three dBA. At the survey location at Steuart and Folsom Streets, the project generated increase due to the trains will be four dBA. These results, according to San Francisco Noise Ordinance, do not require mitigation. (Decibel addition is a process of combining sound levels from different sources. This involves adding the total sound energy and taking the logarithm of the result. As an example, the decibel sum of 60 dB and 60 dB is 63 dB.)

Operational Noise from Exhaust Fan. The planned tunnel emergency exhaust fan will produce a predicted sound level of 90 dBA adjacent to the exhaust opening located just outside of Justin Herman Plaza and within the MUNI trolley bus turnaround (Frobenius, 1988). The fan is to be operated for one hour per month. The San Francisco City Noise Ordinance does not contain specific absolute limits on the noise from stationary equipment which occur at parks as receptors. However, the ordinance does contain a "nuisance" provision that prohibits intruding noises which exceed the existing ambient levels by five dBA or more. Since the existing ambient level was measured at 72 dBA Leq, the sound level from the fan could be up to 76 dBA, if operated in the daytime, without being in violation of the numerical limits.

(The Leq has been used herein as representative of the ambient value.) However, it is judged that a nuisance could be created by fan noise levels in excess of 60 dBA. Accordingly, to comply with this provision of the ordinance, it is recommended that attenuation be provided to limit the fan noise levels to 60 dBA or lower. An attenuation of at least 30 dBA is therefore needed.

Mitigation

SHORT TERM. The following mitigation measures will reduce the temporary adverse impacts associated with construction activity:

> All construction related vehicles and equipment will be properly muffled in order to minimize the noise impact of construction, and where pile driving operations are conducted, holes will be predrilled.
>
> In addition, construction activities at the project site will be carried out Monday through Friday between the hours of 7 A.M. and 6 P.M. to minimize disturbance to local residents. Also, the public will be informed of proposed construction timelines to minimize potential annoyance related to construction noise. This is important for homes and other receptors located within a few hundred feet of construction activity.
>
> The construction noise impacts affecting the Justin Herman Plaza can be mitigated by the use of six foot or higher solid fencing as a temporary barrier along portions of the south and east boundaries of the park. Potential visual or shadow effects of the fence could be reduced by the use of plexiglas or equivalent material instead of wood. Also, consideration could be given to the use of plantings along the fence or possible decorative murals for aesthetic enhancement.

Also, the contractor's operations must conform with all City Ordinances, specifically Article 29 of the San Francisco Police Code, Regulation of Noise.

LONG TERM. To mitigate the sound level impacts which would be created by the tunnel exhaust fan, an appropriate sound attenuator should be provided. The attenuator should provide a sound level reduction of 30 dBA so that the fan sound level would not exceed 60 dBA at the Justin Herman Plaza. A solid structure, such as one made with concrete block, would need to enclose the fan to reduce noise levels this significantly.

Since surface operation in this alternative is limited to temporary holding of disabled vehicles, the 4 dBA increase in project generated noise at Embarcadero/Folsom would not occur.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Construction noise impacts would be generally similar to those described for the Surface Alternative.

LONG TERM. To quantify the sound levels generated by turnback operations, measurements were taken and evaluated as described in the Surface Alternative. We note that there will be reduced noise with the Underground Alternative, as compared with the Surface Alternative, because the turnback operation is shielded by the tunnel. Also, with the Underground Alternative, noise from switch operation will be reduced because the track switches will be shielded by the tunnel.

The predicted noise level impacts which will be created by the planned tunnel exhaust fan are as described for the Surface Alternative.

Mitigation

The recommended mitigation measures for construction noise, train noise and fan noise will be as described elsewhere for the Surface Alternative.

TSM ALTERNATIVE

With this alternative there would be no change in the operations that would affect the noise generated. Therefore, there would be no acoustical impact in reference to the existing ambient sound levels.

NO PROJECT ALTERNATIVE

With the alternative there would be no change in the operations and therefore no acoustical impact in reference to the existing ambient sound levels.

4.8 ENERGY

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Initial impacts on energy would involve energy consumed for construction of the build alternatives. Table 4.8-1 presents the total construction energy consumed, in barrels of oil equivalent, for this alternative. The majority of the energy consumed involves cut and cover, tunneling, and U-wall construction. The major cuts and tunneling require substantial fuel for excavating, loading, transporting, and off loading of excavated material.

LONG TERM. Operations energy requirements involve energy for vehicle propulsion. Table 4.8-1, which summarizes the operations energy requirements by alternative, shows a very slight increase (1.7 percent) in energy required for operating the Surface Alternative over the existing requirement. This increase is due to the additional total route miles traveled by Metro vehicles in the Turnaround facility. The calculation does not reflect the expected throughput increase of the vehicles in the Market Street subway which would be manifest as an increase in energy consumed per vehicle mile traveled due to increased average vehicle speed.

Since the Turnaround Project and other City facilities use renewable hydroelectric power from the Hetch Hetchy Water and Power system, the operations energy requirement of this build alternative should not impact nonrenewable energy resources.

Mitigation

SHORT TERM. Local sources of gravel, track bed and other fill material should be used consistent with supply and cost constraints to minimize haul trip lengths.

LONG TERM. Since the operations energy requirement for the Surface Alternative is not substantially greater than the existing operations energy consumption, no mitigation measures intended to reduce operations energy consumption are required.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The total construction energy for the Underground Alternative is presented in Table 4.8-1. Although this alternative has less total length of track than the Surface Alternative, it has a greater portion of its alignment underground. Consequently, because of the additional excavation, this alternative will consume the greatest amount of nonrenewable energy in the construction process.

LONG TERM. The operations energy requirement for the Underground Alternative is indicated in Table 4.8-1. This alternative has a slightly lower operations energy requirement than the Surface Alternative due to the shorter length of the Turnaround facility.

TABLE 4.8-1. TOTAL CONSTRUCTION ENERGY CONSUMED

ALTERNATIVE	TOTAL CONSTRUCTION ENERGY (B.O.E.) (a)	DAILY OPERATIONS ENERGY REQUIREMENTS (B.O.E. per day) (b)
No Action	-	124.6
Transportation Systems Management	-	124.6
Underground	24,086	126.2
Surface	19,293	126.7

(a) Barrels of Oil Equivalents

(b) Vehicle Propulsion Energy Only

Source: Earth Metrics Incorporated, 1988.

Mitigation

Same as for Alternative 1.

TSM AND NO-ACTION ALTERNATIVES

Impacts

SHORT TERM. Since both of these alternatives are no-build alternatives, no nonrenewable energy resources related to construction activities would be consumed.

4.9 CONSTRUCTION METHODS

Since construction impacts only apply to the build alternatives, Alternatives 3 and 4, the Transportation System Management and No-Action Alternatives, are not discussed in this section.

4.9.1 CUT AND COVER SLURRY WALL CONSTRUCTION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. A typical cross section of the proposed slurry wall construction is shown in Figure 4.9-1. The three foot thick slurry walls are installed first. These walls extend down 30 feet below the base of excavation and are supported on deep piles. During excavation the walls are heavily braced to resist lateral movements due to the load of the adjacent soil. The first level of bracing support is the temporary deck which maintains street traffic during construction. After construction of the permanent concrete box structure, the area is backfilled and the surface restored.

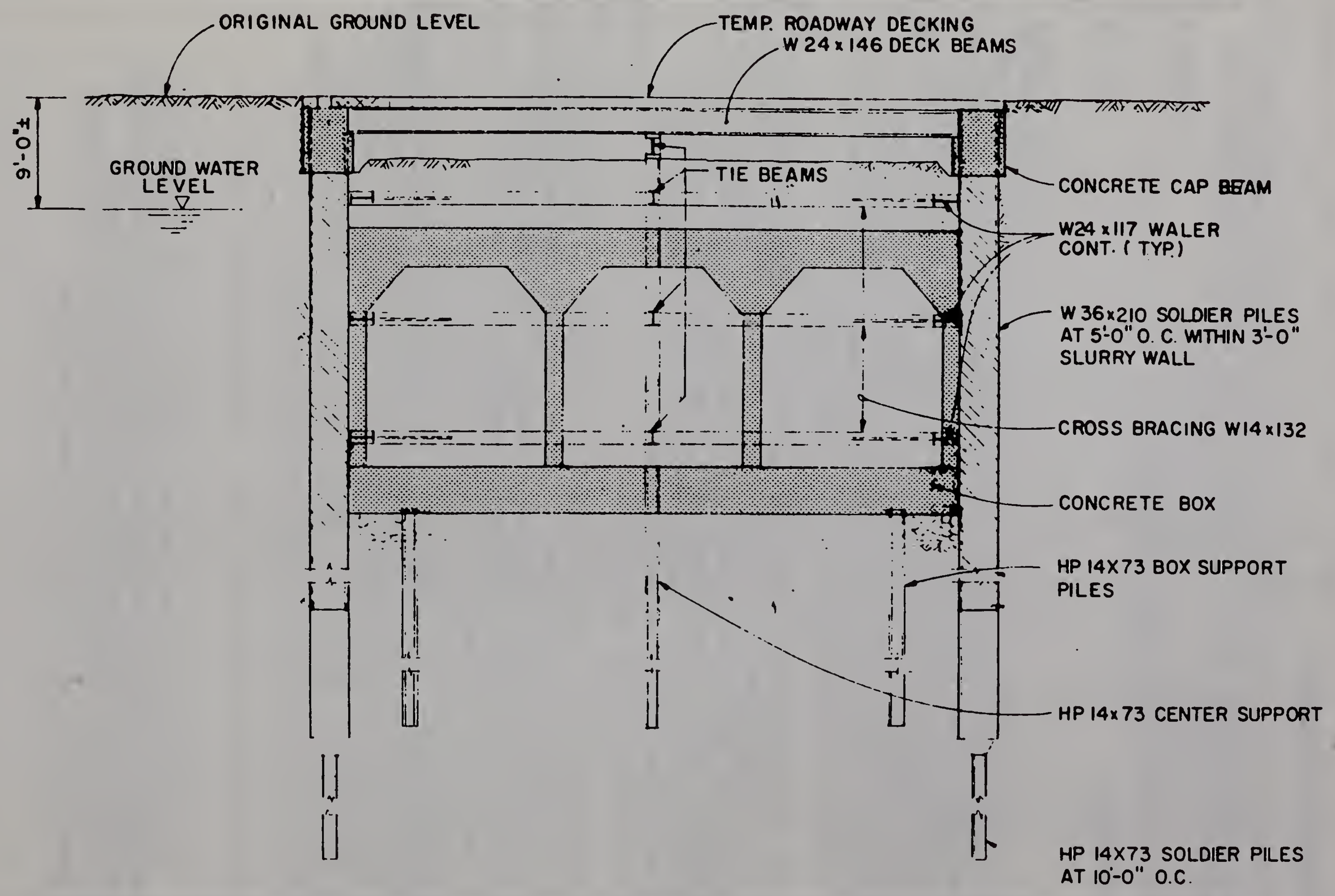
Excavation for the below grade portions of the Turnaround Project will involve removal of soil and groundwater that will require off-site disposal of approximately 43,000 cubic yards of soil. Possible impacts include lowering of the groundwater table in the vicinity of the excavation with resulting settlements of nearby streets and structures. The construction will also result in vertical and lateral movements of the soils in the base of the excavation and adjacent to the excavations.

Excavation and construction of the new MUNI subway structure will interfere with some of the deep pile foundations of the existing elevated Embarcadero Freeway and interfere with traffic on The Embarcadero. Excavation and pile driving, which will occur within the limited headroom under the elevated Embarcadero Freeway, will be required through the old rock sea wall.

The buildings most likely to be impacted by the construction are those between Mission and Howard Streets facing The Embarcadero and possibly the State of California Department of Agriculture Building south of the Ferry Building and east of The Embarcadero. Because the distance to these buildings exceeds 60 feet (about twice the maximum depth of excavation), cut and cover construction is not expected to have an adverse impact on these buildings.

Visual impacts related to construction work, although temporal, cannot be mitigated.

LONG TERM. The construction of the Surface Alternative is not expected to have any significant, construction related, long term adverse impacts except for possible differential settlements of streets adjacent to the MUNI facilities. The only operational impact is that vibration of MUNI trains could be transmitted through the soil to adjacent buildings.


ORIGINAL GROUND LEVEL
TEMP. ROADWAY DECKING
W 24 x 146 DECK BEAMS
9'-0"
GROUND WATER LEVEL
TIE BEAMS
CONCRETE CAP BEAM
W24 x 117 WALER CONT. (TYP.)
W 36x210 SOLDIER PILES AT 5'-0" O. C. WITHIN 3'-0" SLURRY WALL
CROSS BRACING W14 x 132
CONCRETE BOX
HP 14X73 BOX SUPPORT PILES
HP 14x73 CENTER SUPPORT
HP 14X73 SOLDIER PILES AT 10'-0" O.C.

earth metrics

FIGURE 4.9-1 CUT AND COVER CONSTRUCTION STAGE THREE

Mitigation

SHORT TERM. Soldier Pile Tremie Concrete Slurry Walls (slurry walls) will be installed prior to the main excavation to prevent drawdown of the groundwater outside of the excavation, and to minimize the vertical heave at the base of the excavation and the resultant settlement and lateral movement of soil adjacent to the excavation. The slurry walls would be very stiff (36 inches wide with steel piles every five feet), deep (30 feet below bottom of excavation), and heavily braced at ten foot intervals. Slurry wall methods were used extensively on BART, and the technology is well developed in the United States and overseas. A more detailed discussion of the slurry wall construction is contained in Section 3 of Reference Document #2.

Special excavation methods and equipment, including the possible use of special low headroom equipment developed by the Japanese, will be utilized to excavate the slurry wall trench through the rock sea wall. Solider piles will be installed in predrilled holes through the sea wall.

The MUNI structure has been located to minimize the effect of construction on the Embarcadero Freeway and adjacent buildings. To support the Embarcadero Freeway structure during construction, bent column pick-up structures are employed. The pick-up structure can be described as prefabricated steel stanchions installed directly under the support points of the Embarcadero Freeway girders and properly tied to the concrete column for lateral stability. They are then mounted on a steel grillage, through a series of hydraulic jacks, thus transferring vertical loads to the newly installed underpinning piles.

The uppermost tier of cross-bracings also serve as beams for the support of a heavy timber deck to be constructed where ground level traffic interrupted by the construction work needs to be maintained.

An instrumentation program to monitor surface settlements, groundwater, stresses, and strains will be employed throughout the construction operation. Limits and contingency plans will be established prior to construction to define conditions when the construction should be modified or halted. Additionally, a restoration program for repair of surface improvements and minor external damage to buildings has been budgeted and will be implemented by the construction contractor. An expanded description of the monitoring program can be found on page 92 of Reference Document #2.

Design and construction methods will be approved by CALTRANS.

LONG TERM. Normal maintenance (street repaving) should readily accommodate any impact of the differential settlements between subsiding ground and the non-settling MUNI structures. MUNI rails will be mounted on resilient rail fasteners similar to those used in the existing subway.

UNDERGROUND ALTERNATIVE

Impacts

The short and long term impacts of the Underground Alternative are similar to those of the Surface Alternative except the magnitude of construction impacts is greater due to the wider excavation (31 feet to 49.5 feet), the longer excavation (543 feet to 1,058 feet), the increase in disposal volume (43,000 cy to 101,000 cy), and the proximity of old buildings on the west side of The Embarcadero between Mission and Howard Streets. As in the Surface Alternative, visual impacts related to construction activities cannot be mitigated.

Mitigations

SHORT TERM AND LONG TERM. Mitigations are the same as those of the Surface Alternative.

4.9.2 TUNNEL CONSTRUCTION

SURFACE AND UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The existing BART tunnels will be affected by the construction of MUNI tunnels right above their alignment. To understand the impact of the MUNI tunnels on the existing BART tunnels, MUNI tunnel construction is described below.

MUNI tunnel construction will be carried out above the BART tunnels at a distance ranging from four feet at the Spear Street Ventilation Shaft to a distance of 11 feet at TR Station 530, about 450 feet east of the shaft. Even with careful execution of the construction work it has to be anticipated that the balance of forces that exist presently in the soil around the BART tunnels will be altered by the proximity of MUNI tunnel construction, and that readjustments of stresses and strains will occur in the BART tunnel linings. Our analysis indicates that these stresses and strains will not impair the structural capacity of the BART tunnel linings. However, they will contribute to increased leakage through the bolted joints of the tunnel linings.

Where timber piles, cut off during MUNI tunneling, bear against the lining of the BART tunnels, it has been anticipated that pile stubs can exert additional load against the BART linings as the tunnel shield passes over the pile stubs.

The MUNI tunnels will be driven from an access shaft constructed in the future MUNI ventilation structure at the southeast corner of Justin Herman Plaza, westward toward Market Street and the Spear Street Ventilation Shaft. Temporary facilities for removal of excavated material and supply of tunnel lining material will be located in the access shaft. The tunnels will be driven downgrade. During most of the tunnel driving, the tunnels encounter mixed face conditions with fill material in the upper part of the tunnel face and recent Bay Mud in the lower part. After about 300 feet of tunnel driving, the MUNI tunnels will cross above the BART tunnels on Market Street. From here the MUNI tunnels continue above the BART tunnels until they arrive at the Spear Street Ventilation Shaft.

The most significant impact on the BART tunnels will occur at the flexible joint between the BART tunnels and the Spear Street ventilation shaft. Additionally, the drainage water from the new MUNI tunnels will flow into the Spear Street Ventilation Shaft. The Spear Street Ventilation Shaft will require modification to permit the breakthrough of the MUNI tunnels into the shaft. Walls must be strengthened to allow construction of an effective seal between tunnel and shaft. Settlement of the surface improvements and utilities will occur above the MUNI tunnels.

Driving the MUNI tunnels around the short radius curve (R = 300 feet) at Market and Steuart Streets may cause compression and flow of the Recent Bay Mud on each side of the tunnel.

Buildings adjacent to the future MUNI tunnels on Market Street are the Hyatt Regency Hotel on the north side, the Southern Pacific building and the Federal Reserve building on the south side. Both the Hyatt Regency and the Federal Reserve building have been constructed in the 1970s, after the BART tunnels were driven. The Southern Pacific building at 1 Market Street was in place while the BART tunnels were driven. The 11 story brick building is supported on piles penetrating into the sand layers below the Bay Mud. The building was monitored during BART tunnel driving by settlement points located at the top of column bases at street level. These column bases settled only .01 foot during the BART tunnel driving. Even better performance can be expected for the MUNI tunnel driving. Because the MUNI tunnels are driven closer to the street surface, the settlement trough created by the MUNI tunnels is only expected to be half as wide as that created by the lower BART tunnels and, therefore, will have a lesser effect on the building.

The Hyatt Regency Hotel and the Federal Reserve building are also supported on piles extending the building loads to the firm layers of sand below the Bay Mud. Settlements of similar magnitude as those incurred by the Southern Pacific building can be expected and no structural damage should be anticipated. Some settlement of sidewalks and curbs on Market Street should be expected, particularly the sidewalk vault at 1 Market Plaza. Utilities in Market Street over the future tunnels are likely to sustain crack damage due to settlement.

Compressed air used in tunnel driving is likely to escape through street gutters, building basements and utility manholes. Based on experience during BART tunnel driving, the air escapes at a low pressure. No damage is normally associated with this occurrence.

The surface of Justin Herman Plaza will also be impacted during tunnel driving to the extent that surface improvements will settle up to six inches and grouting from the surface will be required prior to tunneling.

LONG TERM. Experience indicated that problems associated with the remolding of the soil around the BART tunnels during MUNI tunnel driving can continue to affect the BART tunnels over a longer term and could result in increased leakage over the "long term" until the remolded soil is readjusted to existing pressures. Similarly, long term settlement of one to two inches may occur over the MUNI tunnels.

Mitigation

SHORT TERM. To assure that stress changes caused by MUNI construction can be accommodated in the tunnel lining, all components of the lining, including the high strength bolts connecting the lining segments, must have adequate structural capacity. During recent visual inspection of the BART lining, corrosion damage of the bolts was noticed. To determine the extent of this damage, further inspection and testing is required; the inspection and testing will be done during final design. (For additional discussion refer to Section 2.6.1 of Reference Document #2.) However, to assure the full design capacity of the BART tunnel lining, it is anticipated that part or all the bolts in the first 450 feet of both BART tunnels east of the Spear Street Ventilation Shaft will have to be exchanged. It is also anticipated that lead caulking in the caulking grooves of the linings will have to be performed to stop increased leakage resulting from the MUNI tunnel construction.

Remedial work will also be required at the BART tunnel seal at the Spear Street Ventilation Shaft. This work may include replacement of parts of the seal assembly and grout injection behind the seal to stop water inflow. Grout injection outside of the lining through existing grout plugs may also be considered in the areas of the tunnel to stop persistent leaks. Additional pumps will be installed at the Spear Street Shaft.

The most critical design considerations are development of methods for locating, cutting and removing existing piles with sufficient care to assure minimum disturbance of the BART tunnels and control of the tunneling at the fill clay boundary. A Tunnel Construction Monitoring Program will be designed and implemented to monitor construction performance. Soil deformation and settlement, tunnel lining strain, and tunnel lining joint opening will be monitored and compared to allowable values established by analysis and experience. Reference survey monuments and benchmarks will be established underground and on the surface to monitor surface and tunnel subsidence and diameter deformation. At the outset of MUNI tunneling, before the tunnels reach the BART tunnels, a Test Section Monitoring Program will be implemented which will confirm the predicted and specified tunneling performance before tunneling reaches the critical area over the BART tunnels.

Contingency construction modifications will be developed ahead of construction to deal with unacceptable deformation of BART tunnels or connecting bolt breakage. Loss of compressed air, inflow of water, loss of ground at the tunnel face, difficulties in pile removal, power or utility failure will also be addressed.

A remedial repair program will be implemented by the construction contractor to repair minor damage to surface improvements, utilities, and buildings effected by the tunneling.

Design and construction methods will be approved by BART.

LONG TERM. Minor remedial work may be required to correct long term surface settlement and leakage in BART tunnels.

4.9.3 U-WALL CONSTRUCTION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. U-wall construction is a special type of open cut used where the alignment is ascending to the surface, between the subway portal and the surface. The concrete structure is open to the sky and shaped to the letter U with a base slab to support the tracks and retaining walls on each side to support the adjacent fill.

The shallow depth of the U-wall (4 to 24 feet) allows the use of interlocking sheet piles to temporarily retain the adjacent fill during the construction. Pile driving and excavation will impact the existing Embarcadero elevated freeway column foundations.

The impacts of U-wall construction include drawing down the existing ground water due to leakage at the interlocking joints.

LONG TERM. The long term impacts are similar to the cut and cover slurry wall construction.

Mitigations

SHORT TERM. Sheet piles will be installed in preexcavated trenches through the rubble fill and rock sea wall. Trench walls will be supported by a bentonite slurry. The sheet piles are driven 20 feet below the base of the excavation to prevent seepage.

The MUNI structure is located to minimize the impact on existing Embarcadero elevated freeway column pile foundation.

LONG TERM. The long term mitigations are similar to the cut and cover slurry wall construction.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM AND LONG TERM. The short and long term impacts are similar in detail and magnitude to the Surface Alternative except that the portal location between Howard and Folsom Streets avoids any excavations in the rock sea wall and the portal structure is clear of the Embarcadero elevated freeway.

Mitigation

SHORT TERM AND LONG TERM. Mitigation measures described in the Surface Alternative are applicable for this alternative.

4.9.4 SEISMICITY/LIQUEFACTION POTENTIAL

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The effects of earthquakes on underground and above ground structures are due to ground vibratory motion and fault displacement. The vibratory motion of the bedrock is transmitted to the ground surface primarily by shear waves through the soil. These waves may cause granular soils to liquify, may deform the ground surface, and may cause structures to move and/or vibrate. The major structures of the Surface Alternative subject to this movement and/or vibration include tunnels, cut and cover box structure, U-wall structure, and the Embarcadero Freeway. Since the MUNI Metro Turnaround Project is not located on any known active fault line, the effects of faulting will not be considered.

The potential short term impacts of earthquakes on these structures, and of the construction operations, include the collapse of excavation faces, the liquefaction of the granular fill material, differential surface settlement, damage to partially completed structures, and interruption to utility services.

LONG TERM. The potential long term impacts due to earthquakes on the completed MUNI structures and facilities include damage to the underground and elevated structures and differential surface settlements that would distort the surface trackage and overhead contact wire system.

Mitigations

SHORT TERM. All construction work will be done in accordance with current building code requirements. Critical construction operations such as major excavation, bracing, and concrete pouring will be done in phases to limit the amount of partially completed work exposed to earthquake damage. Tunnel face support will be required to minimize damage to the excavation face. Back up power will be provided for all critical operations such as tunneling under compressed air.

Fill material at the crown of the tunnel will be grouted prior to tunneling to stabilize the soil and to prevent liquefaction. Grouting or densification of loose sandy fills below the U-wall sections can stabilize these soils and limit vibration induced settlements to tolerable amounts.

Flexible type surface track work will be used, and adjustable rail fasteners will be installed in the subway structures to facilitate realignment of track.

LONG TERM. All new MUNI underground structures will be designed in accordance with the current state of the art of seismic design. All underpinning of the Embarcadero Freeway will be done in accordance with current CALTRANS seismic requirements. As demonstrated in 1906 by the satisfactory behavior of pile supported structures in areas of severe liquefaction, the MUNI Turnaround facilities, supported on pile foundations, are not expected to be adversely affected by liquefaction effects, provided that the loss of support in the liquefied zones is taken into account in the design of the structures.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM AND LONG TERM. The short and long term impacts are similar to those of the Surface Alternative except the magnitude of the potential impacts is greater for the cut and cover structure due to the wider excavation (31 feet to 49.5 feet) and the longer length (543 feet to 1,058 feet).

Mitigation

SHORT TERM AND LONG TERM. Same as in Alternative 1.

4.9.5 UTILITY RELOCATION

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The most significant impacts to utilities resulting from construction operations are to the water, telephone, electric power, and sewer facilities.

The high pressure water system in Market Street ruptured subsequent to the original BART construction due to subsidence. There is currently a 14 inch high-pressure waterline in Market Street above the bored tunnel area that may be endangered if subsidence occurs. A 12 inch high pressure waterline crosses the cut and cover area transversely along Mission Street and will need relocation. Other transverse waterline crossings, occurring along the at-grade section of Folsom Street, at Harrison Street, and at Spear Street, will be affected by construction.

Major telephone duct banks and underground vaults lie in the path of the cut and cover construction area at Mission Street and at Howard near the end of the u-wall section. Damage to the underground vaults could disrupt telecommunication services. Another crossing that could be damaged during construction occurs at the at-grade section at Folsom Street.

Electric power duct banks that cross the cut and cover area north of Market Street and another diagonal crossing of the at-grade section at Howard Street will also be affected by construction. All sewer crossings or encroachments occur within the at-grade portions of the Turnaround Project and could be damaged during construction of the rail bed.

LONG TERM. None anticipated.

Mitigation

SHORT TERM. The high pressure water line in Market Street may require relocation to an area outside the tunnel envelope to avoid subsidence. The 12 inch high pressure water line in Mission Street crosses an area where the tracks will be relatively deep. This facility, as well as waterline crossings of surface track construction, can be supported in place.

A primary concern with telephone facilities is maintenance of services. Both major communication lines to the financial area and transcontinental lines are located in the project area. The diagonal crossing north of Market Street occurs at a point where the tracks are relatively deep. It would be desirable to support the duct banks in place with extreme care taken to avoid damage. This would require working closely with Pacific Bell and exploring the possibility of performing the work with their staff. The crossing at Howard Street is critical. It occurs at a location where the tracks are approaching the surface. It appears that there will be physical conflict with one of the underground vaults and possibly with the duct banks. Since service maintenance is crucial, the vaults may need to be lowered. Protecting the duct banks should be explored with Pacific Bell, requiring careful potholing of the facilities to verify their depth.

The electric duct banks are parallel and closely aligned to the telephone facilities. The crossing south of Market Street should be handled in a manner similar to that of the telephone facilities. The crossing at Howard Street occurs where the tracks are at-grade; it should be possible to support the electrical facilities in place.

All utility relocation or strengthening in the surface section from Howard to Bryant Streets will be included in the Embarcadero Parkway Project. Sewer crossings transversing the surface alignment should be supported in place. The consolidated sewer beneath the Steuart Street tracks should be evaluated to assure that it is structurally capable of handling added loads. Any appurtenances that conflict with the tracks or do not offer required clearances should be reconstructed.

LONG TERM. None anticipated.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The impacts to the telecommunications, electrical, water, and sewer facilities are those mentioned for the Surface Alternative. However, because the portal is located south of Howard Street, impacts related to the telecommunication facilities located under The Embarcadero at Howard are likely to be less significant.

The 36 inch sewer force main and 7 foot 6 inch sewer cross the cut and cover area in Howard Street and appear to encroach into the tunnel area by about one foot. As a result, cut and cover construction could damage the sewer line.

LONG TERM. None anticipated.

Mitigation

SHORT TERM. The same mitigation measures apply in this alternative as in the Surface Alternative. Additionally, the depth of the MUNI box should be lowered by one foot to avoid conflict with the sewer line at Howard Street.

LONG TERM. None anticipated.

4.10 WATER RESOURCES

SURFACE ALTERNATIVE

Impacts

SHORT TERM. Construction of the Surface Alternative is expected to temporarily alter surface drainage characteristics along the cut and cover and U-wall sections of the alignment. Excavation activities involving disruption of pavement and deposition of soils and other debris would divert surface water runoff to alternate storm drain inlets. Storm drains in the project area should be adequate to accommodate disrupted surface drainage. Impacts on surface water runoff from the Surface Alternative are expected to be temporary and, therefore, negligible.

Water quality impacts associated with construction of the Surface Alternative would include the introduction of sediment from excavation and demolition activities into the storm/sewer system. Entry of sediment into the storm/sewer system would have minimal water quality impacts because the City has a "closed" sewer system: sediment is usually deposited in the sewer pipe, carried as bed load or suspended load, and collected in the siltation basin at the treatment plant. As a result, additional maintenance work to clean storm drains and siltation basins could be required during construction. The amount of additional maintenance would depend on the extent and effectiveness of erosion control techniques used to minimize the introduction of sediment and other materials into the storm/sewer system.

Excavation for below grade portions of the Surface Alternative will involve dewatering, or the extraction of groundwater. Possible impacts include lowering of the groundwater table in the vicinity of the excavation with resulting settlements of nearby streets and structures. According to the current project design of the Surface Alternative, it is assumed no dewatering in the fill, behind the cut and cover and U-wall sections of the alignment, or deep dewatering below the excavation, will be allowed. These assumptions regarding groundwater control are intended to avoid the settlements commonly associated with groundwater lowering.

Excavation and construction of the tunnel below Market Street and Justin Herman Plaza will involve localized dewatering, mainly at the access shaft just to the east of Justin Herman Plaza. Dewatering would occur within 100 feet on either side of the access shaft (Frobenius, 1988), but would not be necessary along the tunnel alignment. During tunneling operations, high pressure air will be continually introduced into the tunnel, thereby preventing groundwater from seeping into the tunnel from the sides. Ground subsidence may be expected near the access shaft due to dewatering; however, this subsidence is expected to be localized and minimal (Frobenius, 1988). The subsidence may affect nearby underground utilities, streets, and sidewalks. Minor cracks may occur in streets and sidewalks as subsidence and settlement occurs. Increased stresses may be placed on utility lines and connections. Underground utilities should be designed with sufficient flexibility to withstand ground movement associated with minor subsidence and settlement.

Construction of the project would involve either on-site or off-site disposal of groundwater associated with dewatering. Disposal of groundwater would depend primarily on the presence of contaminants in the groundwater. The extracted groundwater meeting minimum acceptable quality standards can be disposed of in the storm sewer system.

Construction of the proposed project would not impact floodplains or wetland areas as neither occurs in the project vicinity. Similarly, dredge and fill activities are not utilized. Army Corps of Engineers does not require authorization under Section 10 of the River and Harbor Act and Section 404 of the Clean Water Act.

LONG TERM. Construction and operation of the Surface Alternative would not adversely impact surface water runoff. Construction of the project would require modification of local drainage with possible improvements to the storm drainage system. Therefore, the proposed project may have beneficial long term impacts on surface water drainage.

Operation of the surface alignment is not expected to significantly impact surface water quality. The proposed MUNI Turnaround Project is not expected to introduce any new pollutants that are not already present in the drainage system.

Mitigation

SHORT TERM. The following measures are recommended to reduce the surface water runoff/water quality impacts from construction of the Surface Alternative.

Appropriate erosion control devices should be utilized to retain sediment within the project area during the construction period. In addition, excavation operations should be evaluated and inspected periodically by a qualified soils engineer to determine effectiveness of erosion control techniques. Also, additional maintenance work to clean storm drains and siltation basins may be required during construction.

The following measures are recommended to reduce groundwater impacts from construction of the Surface Alternative.

Partial mitigation of settlement impacts would involve the implementation of slurry walls and no dewatering of areas behind the walls or below the excavation. The measures are proposed in the project construction design. In addition, careful monitoring of groundwater conditions and soil movements should be implemented during construction, and modifications of construction procedures be made, if required, to limit movements to tolerable amounts. Such measures may include groundwater recharge, if feasible.

Extracted groundwater with contaminant levels below minimum allowable standards should be allowed to set in sedimentation tanks prior to disposal into the storm/sewer system. Also, extracted groundwater with contaminant levels in excess of minimum allowable standards should be disposed of off-site in an appropriate manner.

LONG TERM. The Surface Alternative is not expected to have significant long term impacts; therefore, no mitigation is required other than patching of structural cracks induced by differential settlement.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Impacts associated with construction of the Underground Alternative would be similar to the Surface Alternative. However, because the Underground Alternative requires a greater amount of excavation and surface disruption, impacts on surface water runoff would be slightly greater than the Surface Alternative. Although a slightly greater amount of surface water runoff would be diverted to alternative storm drains during construction, the impacts on drainage are expected to be temporary and, therefore, negligible.

Water quality impacts associated with construction of the Underground Alternative would be similar but slightly greater than impacts associated with the Surface Alternative. The greater amount of excavation required with the Underground Alternative would have a greater potential for sedimentation and, therefore, a greater impact on water quality. A greater potential for siltation of storm drains would exist. However, impacts on the storm/sewer system from construction of the Underground Alternative could be mitigated through effective erosion control techniques.

Construction of the Underground Alternative will require a greater amount of groundwater extraction due to the greater area extent of excavation required. Dewatering under this alternative may cause settlement over a larger surface area than the Surface Alternative. Settlement over a greater area may cause greater damage to underground utilities, sidewalks, and streets. Construction of the Underground Alternative also has a greater potential to impact nearby buildings due to greater excavation, groundwater withdrawal and potential settlement.

Groundwater impacts associated with the tunneling portion of the alignment in the Underground Alternative would be similar to the impacts associated with the Surface Alternative.

Additionally, construction of the Underground Alternative would not impact floodplains or wetland areas as neither occurs in the project vicinity.

LONG TERM. Same as Alternative 1.

Mitigation

SHORT TERM. The mitigation measures recommended to reduce the hydrologic impacts of the Surface Alternative can be applied to the Underground Alternative. Although mitigation measures would be similar, the Underground Alternative may require more extensive implementation of these measures. The reparation of damaged buildings, utilities, sidewalks, and streets due to settlement may be greater and may require greater funding than the Surface Alternative.

LONG TERM. The Underground Alternative is not expected to have significant long term impacts; therefore, no mitigation is required.

4.11 BIOLOGY

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The proposed alternatives are within a developed area and are expected to have a minimal impact on biological systems. The project will eliminate no natural, pristine habitats and no endangered or threatened species are expected to be disturbed.

Construction of the Turnaround Project will not entail the removal of any street trees; however, the Embarcadero Roadway realignment will require removal of three London plane trees at the eastern corner of the Howard and Steuart Streets intersection. The impact of removal of this vegetation would be insignificant as it provides only minimal value to wildlife.

Silt and dust generation could have a significant localized impact during construction if allowed to coat leaf surfaces. Additionally, construction activities could impact vegetation not scheduled for removal by damaging roots or branches which extend into the construction area.

Grouting will take place within the Justin Herman Plaza in order to stabilize the soil for construction of the tunnel. This process is not expected to have a significant impact provided that the grouting material is chemically stable. If a cement grout is used, there would be a possibility of lye leaching into the soil and harming plant roots. However, in consultation with the City of San Francisco Recreation and Park Department's Urban Forester, it was learned that the Justin Herman Plaza's tree and plant roots are primarily located within a depth of four feet. Therefore, if grouting is to take place beneath the ten foot depth level, as is proposed, grouting should cause no problem to landscaped trees and plants in the Plaza (Cooney, 1988).

There is a possibility of ground subsidence of up to six inches within the Justin Herman Plaza due to construction. If this subsidence is slow and uniform over the area of the Plaza as expected, then there should be no significant impact.

LONG TERM. No long term impacts are expected to biological resources.

Mitigation

SHORT TERM. Any trees removed during the construction process should be replaced with trees of suitable type, size, and density. Replacement trees should have low maintenance requirements and should be visually aesthetic and should be types specified by the City of San Francisco Parks and Recreation Department. In addition, standard construction practices to minimize dust and silt generation and their runoff into the bay (e.g., watering of construction sites and use of temporary catch basins) should be employed.

Temporary fencing should be placed around trees during grading and construction activities to prevent inadvertent damage. Construction within the dripline of mature trees should be avoided to the maximum extent feasible. Also, grouting material chosen should be chemically stable to avoid any possible harm to existing vegetation in Justin Herman Plaza.

LONG TERM. None required.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. The short term impacts will be the same as the Surface Alternative.

LONG TERM. No long term impacts are expected to biological resources.

Mitigation. The same mitigation measures are recommended for the Underground Alternative as has been recommended for the Surface Alternative.

4.12 HAZARDOUS MATERIALS

SURFACE AND UNDERGROUND ALTERNATIVES

Impacts

SHORT TERM. Since historical research and agency consultation have revealed the possibility of hazardous waste contamination along the proposed alignments, it is anticipated that a soil sampling and testing program will be required for compliance with the Maher Ordinance and to also determine if any excavated or exposed soil will constitute a hazardous waste. Soils sampling occurs as part of Final Engineering for the project. The Director of Public Works (DPW) initially reviews the site history and proposed testing program. The Department of Public Health (DPH) also reviews the proposed testing program. Both of these entities may recommend further testing and/or areas of testing based upon their knowledge. If soil sampling is required by the DPW and/or the DPH, the soil sampling and testing program would include borings in the areas of the proposed excavations, at locations of suspected contamination, and at locations where no contamination is suspected. The Enforcement Division of the Bay Area Air Quality Management District would be notified in the event that contaminated soils are found in the project area.

The following soil tests are required by the Maher Ordinance:

1. for inorganic persistent and bioaccumulative toxic substances as listed in Section 66699(D) of Title 22 and the California Administrative Code;
2. for volatile organic pollutants as listed in 40 Code of Federal Regulations, Part 122, Appendix D, Table II;
3. for PCBs;
4. for pH levels;
5. for flammability;
6. for cyanides;
7. for sulfides;
8. for methane and other flammable gases;
9. for those hazardous wastes designated by the Director pursuant to Section 1008;
10. for any other hazardous waste that either the Director of Public Health or the certified laboratory, after an examination of the site history has reason to conclude may be present on the site. The Director of Public Health shall make any such determination with 30 days of filing by the applicant of the site history.

(a) Soil sampling shall be conducted in accordance with procedures for sampling soils approved by the California Department of Health Services or the State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board.

(b) Samples shall be analyzed by a DHS certified laboratory in accordance with methods for analyzing samples approved by the California Department cf Health Services of the State Water Resources Control Board and the San Francisco Bay Regional Water Quality Control Board.

The analysis of groundwater is not subject to the Maher Ordinance. However, consideration should be given to the installation of groundwater monitoring wells; particularly as required by the Regional Water Quality Control Board, where the State's waters have been affected by contamination, e.g., the discharge of fuels from a leaking underground fuel tank where the total petroleum hydrocarbons in soil exceed 100 ppm and/or free product is observed on top of the water.

LONG TERM. None anticipated.

Mitigation Measures

SHORT TERM. Due to the varied nature of hazardous materials, many mitigation options are available. In the case of fuel contaminated soils, the process of aeration and/or biodegradation will substantially lower the fuel concentrations. Where fuels exceed 100 ppm and/or floating product has been observed on top of the groundwater, groundwater monitoring wells are necesssary first to delineate the contaminant plume in the groundwater and then to begin a remedial action program that extracts and treats the contaminated groundwater so as to reduce concentrations. Groundwater monitoring will occur during final design. In the case of solvents, any detectable concentration requires the same action. A more detailed description of the groundwater monitoring program can be found in Reference Document #3.

The heavier petroleum hydrocarbons such as oil and grease are difficult to biodegrade but can sometimes be recycled or excavated and off hauled to a Class II or Class III disposal dump site.

In the case of heavy metals in soil, removal and transport to a Class I dump site is sometimes required. The State will not allow disposal in Class I dump sites after May 8, 1990. There are alternative technologies that can fixate metals in soils.

LONG TERM. None anticipated.

4.13 HISTORICAL AND CULTURAL RESOURCES (SECTION 106 COMPLIANCE)

SURFACE ALTERNATIVE

Impacts

SHORT TERM. The Area of Potential Environmental Impact (APEI) for the project is within an area characterized as archaeologically sensitive. There is a good possibility that the tunneling and cut-and-cover construction activity could uncover recorded or unrecorded cultural resources. The last known location of the sunken gold rush ship Roma is approximately at the point where tunneling would begin under Justin Herman Plaza. The sunken storeship Callao is also believed to be near the area of proposed tunneling activity. Since Alternative 1 involves less excavation than the underground alternative, the relative potential of discovering unrecorded prehistoric or historic cultural resources is less with Alternative 1.

Vehicular access to the historic buildings along East Street Row will be impeded during construction. Other impacts include dust, noise, and dirt associated with construction activity. Alternative 1 is not expected to otherwise impact the East Street Row buildings.

LONG TERM. Cut-and-cover and tunneling construction activity will impact portions of the Old Seawall. Previous surveys have not identified the Old Seawall as eligible for the National Register. A Request for Determination of Eligibility has been prepared by the San Francisco Public Utilities Commission. The State Office of Historic Preservation has concurred with this finding: "The Old Seawall is eligible under Criterion A for its association with the expansion and development of the Port of San Francisco, and is significant at the local level."

Portions of the Belt Line Railway within the project area may have to be relocated to enable construction of the Turnaround Project in conjunction with the Embarcadero Roadway. The existing tracks below the Embarcadero Freeway would be affected by construction for the Turnaround portal structure and the transition of the alignment from surface to below grade. The tracks between Folsom and Bryant are affected by Alternative 1 as well as Embarcadero Roadway realignment. Potential costs for Belt Line relocation will be part of the Embarcadero Roadway Project budget.

Although the presence of the Embarcadero Freeway has a primary impact on East Street Row and the relationship of these historic buildings to the waterfront, the location of the portal structure of Alternative 1 contributes to a change in the character of the existing environment below the freeway and east of the YMCA, the Embarcadero Inn, and the Hihn/Meyer Buildings.

Mitigation

SHORT TERM. A qualified archaeologist will be retained to prepare a construction monitoring program and monitor excavation work. The archaeological monitoring program will be coordinated with the State Historic Preservation Office (SHPO). Construction contracts will include "time buffers" to minimize potential impact on the construction schedule. Below grade, support walls of the Turnaround structure will be kept at least 75 feet from the East Street Row buildings.

LONG TERM. A Request for Determination of Eligibility from the State Historic Preservation Office has been prepared since construction will affect portions of the Old Seawall. SHPO has concurred that the San Francisco Old Seawall is potentially eligible for the National Register of Historic Places. Structures on the National Register or eligible for the National Register are treated in a similar manner in terms of preparing National Historic Preservation Act Section 106 mitigation measures.

In April of 1988, the Department of Public Works requested a Determination of Eligibility for the Belt Line Railway in conjunction with the Embarcadero Roadway Project. In May of 1988, CALTRANS informed the Department of Public Works that SHPO had already concurred with the Determination of Eligibility for the Belt Line recommended by CALTRANS in conjunction with the I-280 EIR. A joint mitigation program, coordinated by San Francisco Department of Public Works and Public Utilities Commission, is planned for related Belt Line impacts.

Portions of the Belt Line will have to be relocated to accommodate both build alternatives for the Turnaround Project. Should provisions be made for the Belt Line north of Pier 30-32, it would be to relocate the Belt Line tracks to the inside northbound traffic lane. The Embarcadero Urban Design Study, which examines urban design issues associated with the alternatives for the Embarcadero Roadway, assumes the Belt Line will be relocated to the inside northbound travel lane between King Street and Pier 30-32. Because of the joint Clearance and Mitigation Program, mitigation measures for the Belt Line will be developed as a part of the Embarcadero Roadway Project for the related transportation improvements of the Turnaround, Embarcadero Roadway, and Historic "F" Line. These mitigation measures will be incorporated where appropriate into the detailed treatment plan and mitigation programs that will be developed during final design of the Turnaround Project.

UNDERGROUND ALTERNATIVE

Impacts

SHORT TERM. Alternative 2 requires more cut-and-cover construction and therefore has a greater potential for encountering possible buried cultural resources.

Support walls of the Turnaround structure below grade will be kept at least 30 feet from the Audiffred Building which would be the closest point of the alignment to East Street Row. Since the cut-and-cover excavation is closer to the East Street Row buildings, architectural features and building facades may incur cracking due to settlement associated with construction of the underground alignment.

LONG TERM. Portions of the Belt Line Railway may require relocation into an adjoining traffic lane. The Old Sea Wall is impacted by Alternative 2. The portal structure of Alternative 2 is located south of Howard Street and therefore does not have an effect on the East Street Row properties.

Mitigation

SHORT TERM. Construction methods will be utilized which maintain ground stability during excavation. Construction procedures will be monitored for building settlements during construction. Construction procedures will be modified, if required, to limit movements to acceptable amounts. Any cracking induced by construction will be patched as required. Funding will be provided for work identified.

LONG TERM. The long-term mitigation measures for Alternative 2 are the same as those for Alternative 1.

TSM ALTERNATIVE

This alternative does not have any impact on historical or cultural resources.

NO-ACTION ALTERNATIVE

This alternative does not have any impact on historical or cultural resources.

4.13.1 COORDINATION WITH STATE AND LOCAL HISTORIC PRESERVATION AGENCIES

There has been coordination of the Turnaround Project with the State Historic Preservation Office, the Northwest Archaeological Survey Office, and the San Francisco Landmarks Preservation Advisory Board.

At the request of the California State Historical Preservation Office (SHPO), a literature research for the historic and archaeological resources in and around the project area has been prepared (see San Francisco Municipal Railway Metro Turnaround Project Historical and Cultural Research to 1887 (Reference Document 10). SHPO also requested that MUNI files from the 1978-1980 period on this project be reviewed. The files were reviewed and the results presented to SHPO. In further preparation of this FEIS, the Northwest Regional Archaeological Survey was also consulted to research possible archaeological resources in the project area. Reference Document 10 reports the result of this research. The Turnaround Project was also coordinated initially with the Landmarks Preservation Advisory Board to review project data and discuss the status of resources in the project area.

A Memorandum of Agreement (MOA) has been prepared to detail in writing the results of the consultation process with SHPO and the measures that will be taken to protect historic and cultural resources (Appendix F).

The archaeological monitoring program, required by the MOA, will include procedures for determining the historical importance and eligibility for the National Register of any cultural artifacts recovered during Turnaround construction, as well as time buffers to allow recovery of artifacts without interference from construction activities.

4.13.2 SUMMARY OF HISTORICAL AND CULTURAL IMPACTS AND MITIGATION

During the response to comments period on the DEIS, a summary table of impacts and mitigation measures pertaining to historical and cultural resources in the APEI was prepared (see Table 4.13-1).

TABLE 4.13-1: MUNI METRO TURNAROUND, SUMMARY OF IMPACTS AND PROPOSED MITIGATIONS TO HISTORIC PROPERTIES IN APEI

Property	Impact	Proposed Mitigation
Union Ferry Depot	No impact due to distance from both build alternatives and the tunneling and cut-and-cover configuration in area between Ferry Building and Justin Herman Plaza. Potential construction impacts for all properties discussed in Section 4-9.	
Southern Pacific Building	No impact due to nature of construction and distance from building. Both build alternatives specify Turnaround in subsurface configuration north of Mission.	
Agriculture Building	Potential short-term impact due to cut-and-cover construction activity.	A construction monitoring program will be carried out as described in Section 4.9. **Any construction-related damage will be repaired.**
Rincon Annex	No impact because of distance from both build alternatives which are underground at Mission; construction area one block from Rincon Annex.	
Audiffred Building	Potential short-term impact due to construction activity. Underground Alternative specifies portal south of Howard and Surface Alternative portal structure will not block physical or visual access between Audiffred Building and waterfront.	A construction monitoring program will be carried out as described in Section 4.9. **Any construction-related damage will be repaired.**

TABLE 4.13-1 (CONTINUED): MUNI METRO TURNAROUND, SUMMARY OF IMPACTS AND PROPOSED MITIGATIONS TO HISTORIC PROPERTIES IN APEI

Property	Impact	Proposed Mitigation
110-116 The Embarcadero	Potential short-term impact due to construction activity. Underground Alternative specifies portal south of Howard and Surface Alternative portal structure will not block physical or visual access to the waterfront.	A construction monitoring program will be carried out as described in Section 4.9. Any construction-related damage will be repaired.
East Street Improvement Co. Building	Potential minor visual impact of portal structure with Surface Alternative. No visual impact with Underground Alternative because portal structure south of Howard. Potential construction impact.	A construction monitoring program will be carried out as described in Section 4.9. Any construction-related damage will be repaired. Careful design of portal structure to minimize visual impact for Surface Alternative.
Hihn/Meyer Building 137-143 Steuart	Potential minor visual impact of portal structure with Surface Alternative. No visual impact with Underground Alternative because portal structure south of Howard. Potential construction impact.	A construction monitoring program will be carried out as described in Section 4.9. Any construction-related damage will be repaired. Careful design of portal structure to minimize visual impact for Surface Alternative.
Embarcadero Inn 144-146 The Embarcadero	Visual and physical impact of portal structure with Surface Alternative. No impact with Underground Alternative because portal structure south of Howard. Potential construction impact.	A construction monitoring program will be carried out as described in Section 4.9. Any construction-related damage will be repaired. Careful design of portal structure to minimize visual impact for Surface Alternative.

TABLE 4.13-1 (CONTINUED): MUNI METRO TURNAROUND, SUMMARY OF IMPACTS AND PROPOSED MITIGATIONS TO HISTORIC PROPERTIES IN APEI

Property	Impact	Proposed Mitigation
Embarcadero YMCA 166 The Embarcadero	Major visual and physical impact of portal structure with Surface Alternative; difficult physical access to/from waterfront because of location of portal structure between YMCA and waterfront. YMCA is a major activity center on San Francisco Embarcadero waterfront. No or minimal impact with Underground Alternative. Potential construction impacts. The Surface Alternative would have an adverse effect based in the Criteria of Adverse Effect conditions B and C.	A construction monitoring program will be carried out as described in Section 4.9. **Any construction-related damage will be repaired.** Application for National Register to be prepared. Careful design of portal structure to minimize impact if surface Alternative selected.
Seaman's Institute 249-242 Steuart	No impact from Turnaround Project. Turnaround facilities will be in Embarcadero roadway median south of Howard under both Alternatives.	
Hills Coffee 2 Harrison	Potential for Surface Alternative Turnaround operations to affect views to and from the waterfront. Surface Turnaround operations could contribute to a barrier effect between Hills Plaza and the waterfront and introduce visual, audible impact out of character with this National Register property. A potential adverse effect under Criteria B and C.	Apply Turnaround urban design proposals if Surface Alternative selected as a partitial mitigation to Surface Alternative Turnaround operations.
Pier 22-1/2 Fireboat House	No impact.	
Pier 24 Bulkhead	Surface turback operations and facilities will change the visual character of the area in front of this Bulkhead. Potential adverse effect under Criteria C.	Apply Turnaround urban design proposals if Surface Alternative selected as a partitial mitigation to Surface Alternative Turnaround operations.

TABLE 4.13-1 (CONTINUED): MUNI METRO TURNAROUND, SUMMARY OF IMPACTS AND PROPOSED MITIGATIONS TO HISTORIC PROPERTIES IN APEI

Property	Impact	Proposed Mitigation
Pier 26 Bulkhead	Surface turback operations and facilities will change the visual character of the area in front of this Bulkhead. Potential adverse effect under Criteria C.	Apply Turnaround urban design proposals if Surface Alternative selected as a partitial mitigation to Surface Alternative Turnaround operations.
Pier 28 Bulkhead	Surface turback operations and facilities will change the visual character of the area in front of this Bulkhead. Potential adverse effect under Criteria C.	Apply Turnaround urban design proposals if Surface Alternative selected as a partitial mitigation to Surface Alternative Turnaround operations.
San Francisco-Oakland Bay Bridge	No impact.	
Cable Car System	No impact. Turnaround in tunnel near cable car turnaround under each build alternative.	
Belt Line Railway	The Surface Alternative will require relocation of portions of the Belt Line tracks. This could result in an adverse impact under Criterion A.	Belt Line would be relocated into the inside northbound traffic lane if a provision is made for the Belt Line north of Pier 30-32. The city has requested that SHPO reconsider the Belt Line status as Determined Eligible for the National Register. A joint mitigation program for the Belt Line Railway has been proposed to SHPO by the city.
New Seawall	No impact. Neither alternative affects the New Seawall.	

TABLE 4.13-1 (CONTINUED): MUNI METRO TURNAROUND, SUMMARY OF IMPACTS AND PROPOSED MITIGATIONS TO HISTORIC PROPERTIES IN APEI

Property	Impact	Proposed Mitigation
Old Seawall	Both alternatives will impact the Old Seawall by excavation or cut-and-cover construction activities for the Turnaround. Both build alternatives will have an adverse effect on the Old Seawall based on application of Adverse Effect Criteria A.	Demarcate line of Old Seawall through Turnaround project area with "red line" and prepare historical marker(s) to place in pavement along this line explaining significance of Old Seawall in San Francisco history and/or recover rocks from Seawall structure and construct a structure in the project area from these rocks or incorporate Old Seawall rocks in pavement areas, or possibly construct model of the Old Seawall utilizing Seawall rocks. Place historical markers detailing purpose, design and construction of Old Seawall.
Storeship Roma	This buried storeship could be impacted by both build alternatives.	The archaeological moinitoring and recovery program as required in the Memorandum of Agreement, Appendix F, will ensure protection and recovery of cultural resources.*
Storeship Othello	This buried storeship (final disposition unknown) could potentially be impacted by both build alternatives.	The archaeological moinitoring and recovery program as required in the Memorandum of Agreement, Appendix F, will ensure protection and recovery of cultural resources.*

* Should a storeship be encountered during construction, eligibility status for the National Register would be determined as part of the Archaeological monitoring and recovery program.

4.14 PARKLANDS (SECTION 4(f) COMPLIANCE)

JUSTIN HERMAN PLAZA

Proposed Use. The Surface and Underground Alternatives would not directly take any parkland from Justin Herman Plaza, but both alternatives would impact the park in the short term due to the proposed construction activities. Construction activities, even though temporary, would interfere with the existing use of the park by generating noise, visual, and air quality impacts.

In addition, construction activities would impact the landscaped trees and grass areas in the park. This is because a process called grouting must take place underneath Justin Herman Plaza. Grouting, which is the injection of a commercial clay type mixture to stabilize the fill material which exists underneath the park, is necessary in order to prepare the fill for tunneling. The grouting involves drilling holes of approximately 2.5 inches in diameter every 15 feet above the tunneling. A plastic tube is then inserted into the drilled hole and the grouting material is injected into the fill at a depth of ten feet below the surface (Frobenius, 1988). Grouting material is usually a bentonite mixture (commercial clay); however, other types of grouting material may be used including cement grout, which is a water and cement mixture, and chemical grout material, which is a sodium silicate mixture. Of the three types of grouting materials, the cement and the chemical grouting material may adversely affect tree roots if these materials come in contact with the roots. In consultation with the City of San Francisco Recreation and Park Department's Urban Forester, it was learned that the Justin Herman Plaza's tree and plant roots are primarily located within a depth of four feet. Therefore, if grouting is to take place beneath the ten foot depth level, as is proposed, grouting should cause no problem to landscaped trees and plants in the Plaza (Cooney, 1988).

The only potential impacts to the Justin Herman Plaza's landscaping will occur where soil is disturbed for drilling purposes. There is also a possibility that tunneling construction activities underneath Justin Herman Plaza may cause slight subsidence of the area directly above where tunneling is to take place. This area will subside uniformly about one or two inches over a period of 24 hours after tunneling takes place. However, this amount of subsidence will not be noticeable. Subsidence of a maximum of another four inches (total six inches) may occur over a six month period but is not expected to be noticeable and, therefore, will not affect activities, landscaping, or structures within the park. However, there is the possibility of minute cracks in the cement in proximity to the area above the tunneling. In the event cracking of cement does occur, these cracks will need to be repaired (Frobenius, 1988).

The grouting process could take approximately three weeks within the Justin Herman Plaza and since, as previously mentioned, holes are to be drilled with plastic tubing inserted, for safety reasons, it may be necessary to sign or cordon the area of grouting. Other short term construction impacts include increased particulate emissions (dust) due to drilling in Justin Herman Plaza and also due to earthmoving activities near the Bayfront Promenade. In addition, increased pollutant emissions may occur due to the operation of gasoline and diesel powered equipment near the Plaza and Bayfront Promenade. There is a concern that the temporary increase in air particulate and pollutant emissions may adversely impact park users especially during the noon time period of 12 P.M. to 1:30 P.M. when it is estimated that approximately three to eight thousand people utilize the park (Ashe, 1988). The same concern is true for temporary noise construction impacts due to the proposed construction activities within the Justin Herman Plaza area (drilling and grouting) and in areas close to the southeastern part of the Plaza near the Bayfront Promenade where cut and cover construction and hauling of excavated material is planned to take place.

The existing sound level in the area of the Justin Herman Plaza is approximately 69 decibels peak hour Leq. Construction activities in the Justin Herman Plaza will produce a temporary sound level of 80 to 90 decibels at the southeastern part of the park where hauling of excavation material and cut and cover construction is to take place. This noise will be clearly audible and a source of some potential disturbance to the public which utilizes the park especially during the noon hour time period (12:00 to 1:30 P.M.), and also to those who utilize the Plaza for activities and events.

The planned tunnel emergency exhaust fan would also produce noise impacts. Section 4.7-3, Noise Impacts, states that the exhaust fan would produce a predicted sound level of 80 dBA adjacent to the exhaust opening at the south end of Justin Herman Plaza. Because the fan is for use during emergency conditions, the fan is to be operated and tested only for one hour per month. The San Francisco City Noise Ordinance does not contain specific absolute limits on the noise from stationary equipment which occur at parks as receptors. However, the ordinance does contain a "nuisance" provision that prohibits intruding noises which exceed the existing ambient levels by five dBA or more. Since the nuisance ordinance recommends noise levels to be limited to 60 dBA or lower, noise attenuation of at least 30 dBA is therefore needed for this exhaust fan. This amount of noise attenuation is feasible and will be detailed during final design.

Alternatives. The no-build alternatives, which would eliminate adverse impacts on Justin Herman Plaza, are not adequate to fulfill the transportation objectives of the City of San Francisco and the region. Without the construction of the locally preferred alternative, the MUNI Metro system would not be able to accommodate the expected demand increases by Year 2000. Additionally, the resulting increased traffic volumes in the Downtown area would produce stop and go (LOS F) conditions and above standard local CO concentrations during peak periods at many intersections along and in the vicinity of Mission and Market Streets, MUNI's primary transit thoroughfares. Alternative alignments to construct the turnback track on the surface in the vicinity of Justin Herman Plaza would produce construction impacts as well as noise and visual impacts associated with turnback operation adjacent to the Plaza. These long term adverse effects would be eliminated by tunneling under the Plaza.

Measures to Minimize Harm. The emphasis for mitigation at this site would be (1) to minimize the short term temporary construction impacts of pollutant and particulate emissions and noise impacts upon the public who use and enjoy the plaza especially during the noon lunch period between 12:00 P.M. and 1:30 P.M.; and (2) to minimize any potential impact of grouting upon landscaped trees and plants within Justin Herman Plaza. The following measures are, therefore, recommended for both Alternative 1 and Alternative 2 which would have identical short term construction impacts upon Justin Herman Plaza:

Spray water (if the San Francisco Water Department determines that this will be permitted in spite of drought conditions) or spray dust palliatives and vacuum sweep paved areas to control dust, if spraying of water is not permitted due to drought conditions. Also, dump truck loads should be covered with canvas or tarps when hauling excavated fill material to control dust, and trucks should be kept off of dirt areas and on paved surfaces to minimize road dust.

Excessive idling of gasoline and diesel powered construction equipment should be avoided in order to minimize the temporary increase in pollutant emissions from this equipment.

The timing of construction activities within the Plaza should be coordinated with the San Francisco Recreation and Parks Department to coincide with a time period of little or no activities planned for the Plaza. This measure will reduce the amount of potential revenue loss to the Recreation and Parks Department since they can schedule events and activities ahead of time.

A six foot high temporary acoustical barrier in the form of a solid wood fence should be installed along the property line in the vicinity of the south-eastern corner of the Plaza. If the placement of the six foot temporary acoustical wood barrier proposed creates any visual or shadow impacts, a Lexan plastic transparent acoustical barrier can be placed instead of the wood barrier. This type of barrier would not create visual impacts since it is transparent. Further mitigation for minimizing visual impacts of the temporary acoustical barrier would be a landscape treatment on the park side of the fence as specified by the City of San Francisco Recreation and Park Department. This barrier will reduce the construction noise impacts of the cut and cover construction in the Embarcadero Roadway to an acceptable level (between 72 and 80 decibels) so that the public will be able to use the Plaza during the noon lunch hour and for scheduled events and activities. Also, to the extent possible, construction activity within Justin Herman Plaza and the vicinity of the plaza should cease during the noon lunch period between 12:00 P.M. and 1:30 P.M. in order to not disturb people who use the Plaza for lunch. Also in order to reduce noise impacts from construction activities the diesel driven air compressor should be located as far away as possible from the parkland and should be provided with temporary shielding around it.

Even though grouting will take place below depths where tree and plant root system are located, only a clay mixture (bentonite) grout, rather than a cement or chemical grout, will be used during the grouting process. Also, if any trees or plants are damaged or disturbed by the grouting process they will be replaced with trees and plants of suitable size, type and density to provide visually aesthetic landscaping. These planting materials will be specified by the City of San Francisco Recreation and Park Department. In addition, upon completion of the drilling process, remedial action must be taken to restore the grass and soil where drilling holes have been emplaced.

Gradual subsidence of parkland over the proposed tunnel to as much as six inches could potentially affect drainage patterns, paved surfaces and create potentially hazardous conditions. As a mitigation, any affected area of the Plaza should be brought back to its original condition following construction and also following one year of postconstruction monitoring.

To mitigate the potential sound level impacts which will be created by the tunnel exhaust fan, an appropriate sound attenuator should be provided. It is recommended that the attenuation provide a sound level reduction of at least 30 dBA so as not to exceed a fan sound level of 60 dBA at the Justin Herman Plaza. The specific design of the mitigation will be detailed as part of the final design of the Turnaround Project.

BAYFRONT PROMENADE

Proposed Use. Construction of the Turnaround Project would occur alongside the Promenade but would not directly take any parkland from the Promenade. The proposed construction activities would create temporary increases in air pollutant and particulate emissions and in ambient sound levels. Access to the Promenade would also be restricted. However, these impacts are temporary, lasting only for the duration of construction activities up to 36 months, and are not considered significant (Rossi, 1988).

Alternatives. The no-build alternatives would not accommodate the City's and the region's long term transportation goals. Although construction of the Turnaround Project would affect access and use of the Promenade, a surface alignment for turnback operation along The Embarcadero or the vicinity would produce construction impacts and long term noise, visual, and access impacts. Therefore, the underground alignment is the only prudent option for the Turnaround Project in this area.

Measures to Minimize Harm. The emphasis for mitigation at this site would be to minimize temporary construction impacts associated with noise, particulate and pollutant emissions, and access. The following measures are, therefore, recommended.

Spray water (if the San Francisco Water Department determines that this will be permitted in spite of drought conditions) or spray dust palliatives and vacuum sweep paved areas to control dust if spraying of water is not permitted due to drought conditions. In addition, dump truck loads should be covered with canvas or tarps when hauling excavated fill material to control dust and trucks should be kept off of dirt areas and on paved surfaces to minimize road dust.

Excessive idling of gasoline and diesel powered construction equipment should be avoided in order to minimize the temporary increase in pollutant emissions from this equipment.

Also, in order to minimize noise impacts of construction, all construction equipment and related vehicles such as hauling trucks should be properly muffled. In addition, as part of standard construction procedures, temporary access would be provided across the Embarcadero Roadway by decking the roadway so that pedestrians can continue to get to the Promenade.

Temporary construction impacts will be reviewed as part of the Recreation and Park Department permit process.

BAYSIDE PLAZA BUILDING OPEN SPACE

Proposed Use. Construction would occur alongside this open space. Because the open space lies on the land side of The Embarcadero opposite the Promenade, construction impacts to the plaza would be the same as to the Bayfront Promenade, except that pedestrian access would not be restricted.

Alternatives and Measures to Minimize Harm. See Bayfront Promenade.

PROPOSED RINCON POINT PARK

Proposed Use. Construction of the Turnaround Project would not impact the proposed Rincon Point park in the short term because the proposed MUNI Turnaround construction activities would take place before the proposed Rincon Point park is developed (Conrad, 1988).

Alternatives. A surface alignment with turnback operation along the park would be disruptive to park users and restrict park access from the surrounding land uses.

Measures to Minimize Harm. The preferred alternative would allow landside access to the north end of the park because the turnback alignment would be entirely underground. The portal and tail track would parallel the west side of the park but would only be used to temporarily store disabled cars during the daytime. The portal would be designed to minimize visual intrusion of the structure itself.

HISTORIC RESOURCES

Proposed Use. Construction of the preferred alternative would have a potential adverse effect on two historic properties, the Belt Line Railroad and the Old Seawall. In addition, there is a likelihood of encountering archaeological resources that meet the Section 106 criteria for eligibility in the National Register. These historic and archaeological resources are covered by this Section 4(f) statement.

The Belt Line Railroad is potentially eligible for the National Register. The construction of the preferred alternative would cause the tracks to be relocated from their current location in The Embarcadero in the project area. Replacement tracks in the inside northbound lane of The Embarcadero could be utilized for freight traffic, if the Port of San Francisco so desired.

Tunnel construction for the preferred alternative (either excavation or cut and cover) would cut through a portion of the Old Seawall. Excavation would also unearth the remains of the storeships, Roma and Othello.

Alternatives. Although the no-build alternatives would forestall any adverse impacts to the aforementioned historic resources, City of San Francisco and regional transportation could not be met. MUNI Metro capacity and reliability would remain unimproved and projected ridership could not be accommodated. A surface alignment between Market and Howard Streets would avoid unearthing the storeships and altering the Old Seawall but would affect the Belt Line alignment. Additionally, surface MUNI Metro turnback operation would produce long term noise and visual intrusions on the surrounding parklands: Justin Herman Plaza, Bayfront Promenade, and Bayside Plaza Open Space. Since surface operation would be severely disruptive to the existing open space areas, the underground alignment appears to be the most feasible and prudent alternative.

Measures to Minimize Harm. Belt Line would be relocated into the inside northbound traffic lane if a provision is made for the Belt Line north of Pier 30-32. The City has requested that SHPO reconsider the Belt Line status as Determined Eligible for the National Register. A joint mitigation program for the Belt Line Railway has been proposed to SHPO by the City.

Demarcate line of Old Seawall through Turnaround project area with "red line" and prepare historical marker(s) to place in pavement along this line explaining significance of Old Seawall in San Francisco history and/or recover rocks from Seawall structure and construct a structure in the project area from these rocks or incorporate Old Seawall rocks in pavement areas, or possibly construct model of the Old Seawall utilizing Seawall rocks. Place historical markers detailing purpose, design and construction of Old Seawall.

The archaeological monitoring and recovery program as required in the Memorandum of Agreement, Appendix F, will ensure protection and recovery of cultural resources. Should a storeship be encountered during construction, eligibility status for the National Register would be determined as part of the archaeological monitoring and recovery program.

4.15 POTENTIAL SECONDARY IMPACTS OF THE MUNI METRO TURNAROUND PROJECT

As stated previously, although the Turnaround Project does not include the proposed southern extension of MUNI Metro to Mission Bay, it does facilitate the construction of the Extension. The Turnaround Project build alternatives provide the track and portal construction which would allow further extension of surface track along the median of the Embarcadero Roadway and King Street to Mission Bay at Sixth Street.

The Extension, described in Section 3.4.4, would serve as the principal transit link between the Central Waterfront/Financial District and Mission Bay, providing four high platform stations in the Rincon Point, South Beach, and China Basin areas.

Its construction would be accomplished as part of the Embarcadero Parkway project since the entire route to Sixth Street would follow the Embarcadero Parkway and redesigned King Boulevard. Construction of the Parkway is scheduled to begin in 1991-1992.

Because the Extension is considered a likely secondary impact of implementing the build alternatives, the Environmental Impact Statement highlights the impacts to be anticipated from construction and operation of the Extension. The potential impacts have been identified in the _I-280 Transfer Concept Environmental Impact Report_ (CALTRANS, 1984) and are summarized below. The detailed impacts of the extension project will be considered in a separate future environmental document.

IMPACTS

Short Term. Construction of the MUNI Metro Extension to the vicinity of Sixth and King Streets would cost approximately $15 million. No Federal funds are expected for construction of the Extension. The Extension would be built entirely on the surface and would require temporary relocation or accommodation of traffic, parking, and goods movement, particularly along The Embarcadero. Slowed traffic movements could result in higher auto emissions and reduced Levels of Service along The Embarcadero. Access to Port of San Francisco piers and other activities along the Waterfront south of the Bay Bridge may be disrupted. Four stations, including one at Hills Plaza, would be constructed as part of the Extension project, and their construction could produce temporary access problems to ongoing development at Rincon Point and South Beach.

Temporary disturbance to commercial and residential places near the construction area due to increased noise levels could also occur. Additionally, the excavation of the existing roadway, installation of base aggregate, ties, rails, and regrading with asphalt or concrete would be necessary and may engender dust and vibration. Beneficial impacts would result from creation of temporary employment in the building trades.

Long Term. The Turnaround Project would produce secondary impacts related to MUNI Metro operations at the western portals of the Market Street subway, i.e., Duboce and West Portal. Portal operation during peak periods currently involves coupling of trains, requiring cars from one line to wait for cars from one or two other lines to form three and four car trains before entering the subway. Delays caused by holding and coupling of cars at the portals disrupt Metro's reliability and produce unscheduled gaps in service. The Turnaround Project would minimize portal delays by allowing ten additional trains per hour to travel in the subway, thereby reducing the need to couple cars before they enter the subway.

Long term, secondary impacts would also result from the extension of MUNI Metro to Mission Bay. The Extension would provide increased marketability of residential uses in the Rincon Point, South Beach and Mission Bay areas, greater access between China Basin/Central Waterfront and downtown, improved links to regional transit (e.g., the Peninsula Commute Service and BART), and decreased travel times. The Hills Plaza Station would serve future activities at Piers 24 and 26, the new Rincon Point park and proposed hotel nearby and Rincon Hill residences. It is anticipated that the Extension would allow MUNI Metro to absorb the projected ridership growth along the Central Waterfront and increase MUNI's share of the modal split for trips to and from the Waterfront area.

The Extension would require approximately eight additional light rail vehicles over and above those operating as a result of the Turnaround Project, an additional storage facility, and increased operating costs. Added rail storage and maintenance requirements would be attributable to the Extension as well as the Turnaround Project, J-line Connection, and the F-line. Because of street crossings and planned preempted signalization in favor of MUNI Metro, delays and queuing of autos could result during peak periods, most notably at the intersections of Embarcadero/Bryant and King at Third and Fourth Streets.

4.16 CUMULATIVE IMPACTS

The Turnaround Project is a capital improvement program to enhance the rail transit capacity of the San Francisco Municipal Railway Metro system and to reduce the cumulative impacts associated with central business district development permitted under the Downtown Plan. By improving the operational capability of the Metro system and expanding capacity, the Turnaround Project serves as a primary element in increasing public transit use as a part of the City's transit first policy. This transit capital improvement project allows San Francisco land use plans and policies to be carried out by enhancing transit capacity and minimizing negative transportation impacts associated with downtown development.

The Turnaround Project is also an element of Waterfront transportation program to improve circulation along the Northeastern Waterfront and in the Rincon Point/South Beach and China Basin areas. The other related transportation projects are:

- Embarcadero Parkway
- I-280 on and off-ramp redesign
- MUNI Metro Extension to Mission Bay
- F-line streetcar service along Market Street and The Embarcadero to Fisherman's Wharf

The Waterfront transportation projects are described as integral elements of the South of Market Plan (1988) and Mission Bay Draft Environmental Impact Report (1988). Trip generation and MUNI capacity statistics utilized in these two documents assume that both the Turnaround Project and MUNI Metro Extension to Mission Bay are in place by year 2000. Earlier documents such as the Rincon Hill Final Environmental Impact Report (1984), the Downtown Plan and EIR (1984) and the Rincon Point/South Beach Redevelopment Plan (1980, 1984) also cite the need for the MUNI Metro Extension and Embarcadero Parkway project.

The Embarcadero Parkway is the key element in the plans for circulation improvements along the Waterfront. Redesign of the Embarcadero Roadway into a treelined parkway will offer the opportunity to construct surface rail along the right-of-way, to enhance the Waterfront environment, and to facilitate traffic movement along the Waterfront to the I-280 freeway via King Street, which will also be redesigned as part of the Parkway project. The realignment of The Embarcadero could permit Justin Herman Plaza to be enlarged and allow for the creation of a Waterfront park at Rincon Point.

The Parkway project, administered by the San Francisco Department of Public Works, would include funding for displacement of existing land uses between Howard and Folsom east of Steuart Street; for removal and replacement of affected Belt Line track; for mitigating access-related construction impacts; and for streetscape, signalization, and intersection improvements. Additional funding is programmed as part of the Embarcadero Parkway Project to remove the stub end of the I-280 freeway between Third and Sixth Streets and to construct new on- and off-ramps linking I-280 with King Boulevard.

The proposed MUNI Metro Extension, funded and managed through PUC capital grants, would follow the median of the Embarcadero Parkway south to Sixth and King, and allow sufficient space to construct high level inbound and outbound loading platforms at four locations along this alignment.

North of Howard Street, the Parkway design would be more confined due to the existing elevated freeway structure of Highway 480. Because San Francisco voters approved a November, 1986, ballot measure to retain the elevated freeway structure, the Embarcadero Parkway and F-line design must conform with the freeway's alignment and support piers from Howard to Broadway. The design for this segment of the Parkway is included in the Embarcadero Project Urban Design Study, published in September, 1988. Schedule for the combined Waterfront transportation projects is presented in Figure 4.16-1.

Since the Embarcadero Parkway is being designed to improve traffic circulation without increasing roadway capacity, it would provide beneficial impacts to the adjacent planned development and to the Waterfront, but could not accommodate increased traffic (see Section 4.4, Traffic and Transportation). Additional trips created by the new residential and commercial development in Rincon Point, South Beach, and Mission Bay would, therefore, be absorbed by transit, particularly the MUNI Metro Extension.

If MUNI Metro is extended to Mission Bay, 6,230 to 8,500 P.M. peak riders and over 20,000 daily riders would be expected to ride south of the Turnaround (DKS Associates, 1987). Currently, only one MUNI line, the 32-Embarcadero, serves the Embarcadero corridor between Market and King Streets. This line has a capacity of 610 places per two hour peak period (Figone, MUNI Planning and Schedules Department, 1988). The extension of MUNI Metro would be beneficial to the ongoing and planned development in Rincon Point, Rincon Hill, South Beach, and Mission Bay by providing over 2,600 additional peak period places for commuters and residents in these areas, and for Peninsula Commute Service riders transferring at Mission Bay (Manuel Padron & Associates, 1987).* The added transit accessibility is expected to shift trips from auto to transit.

The Extension would, however, create added visual impacts along the Embarcadero Parkway, particularly at each station location. The number of passing trains, for example, at the Hills Plaza Station between Folsom and Harrision Streets, is planned to be 18 per hour during peak periods and 12 during the midday. Additionally, traffic queuing may result at Bryant and The Embarcadero because of signal preemption in favor of MUNI Metro at that intersection (DKS Associates, 1987).

The proposed F-line extension from downtown San Francisco along Market Street to Fisherman's Wharf was adopted by the Public Utilities Commission and Board of Supervisors in 1983. As a result of this policy decision, the PUC approved a plan for the F-line to substitute for the proposed E-line streetcar, which would have operated along the Waterfront from Mission Bay to Fisherman's Wharf. The advantages of substituting the F-line extension to Fisherman's Wharf are:

1. The F-line was forecasted to carry 10,000 riders per day along The Embarcadero, and could easily absorb the 400 riders a day estimated for the E-line concept north of Market Street (San Francisco, I-280 Transfer Concept Program, 1985).

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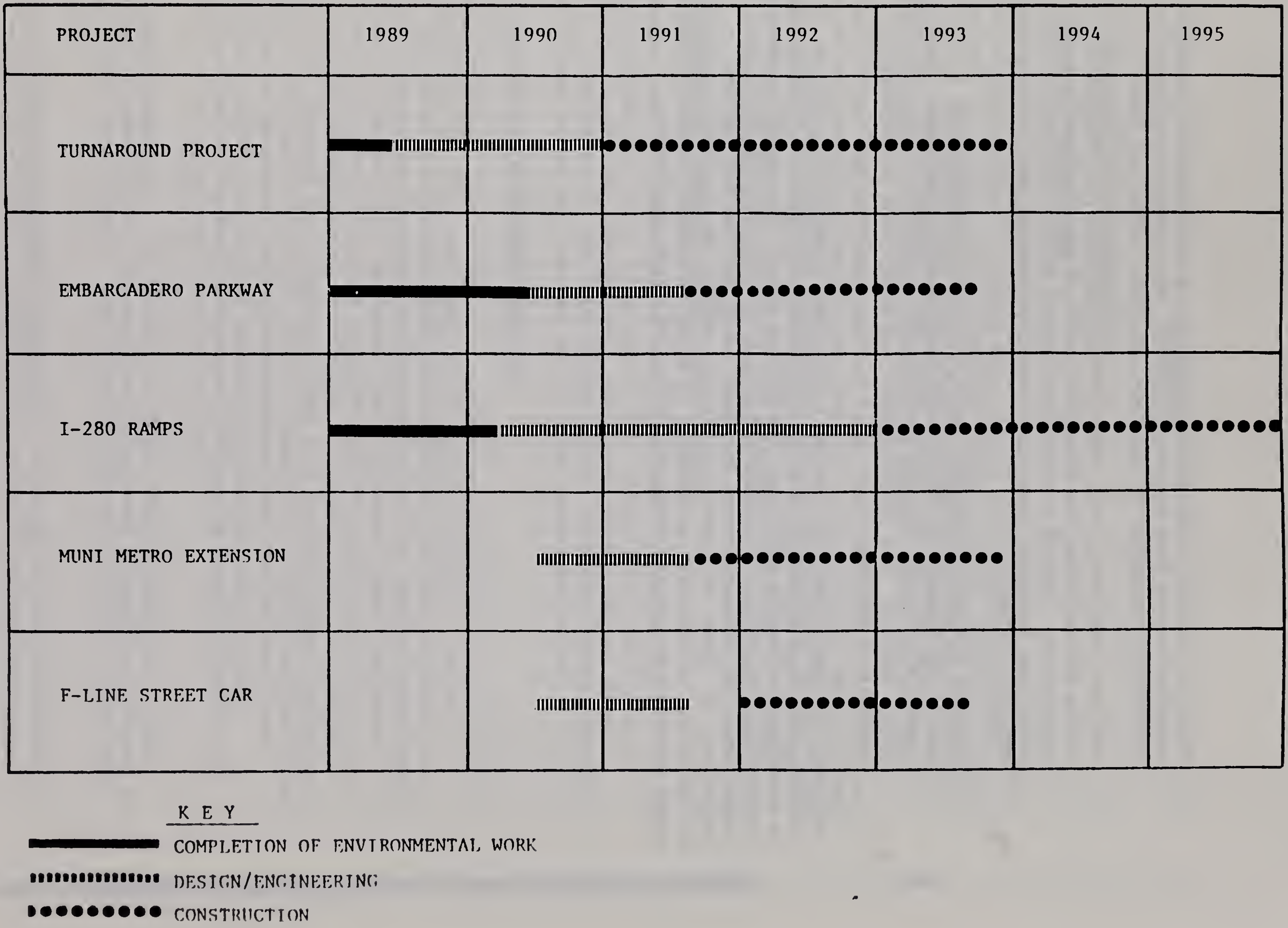
* The exact location of the Peninsula Commute Service (PSC) station in Mission Bay and the feasibility of extending PCS to downtown San Francisco are to be studied in a forthcoming EIS, prepared jointly by UMTA and the Joint Powers Board, which is planning for the future operation of the Peninsula rail service.

FIGURE 4.16-1 SCHEDULE FOR EMBARCADERO PARKWAY RELATED PROJECTS



2. Historic streetcars operating on the F-line would attract tourists traveling to and from Fisherman's Wharf, thus potentially relieving overcrowded conditions on the Hyde and Powell cable car lines.

3. MUNI has found that joint LRV/streetcar operation, as required by E-line service along the Waterfront south of Mission Street, to be problematic. Similar experience at Duboce Portal and along Church Street has indicated that joint operation creates service delays on MUNI Metro lines.

4. Frequent service on the MUNI Metro and F-line combined with a convenient transfer at Embarcadero Station would facilitate trips between Mission Bay and the Northeastern Waterfront without requiring direct service. The 32-Embarcadero bus could thus be abandoned as duplicative service.

Additionally, the F-line would become a principal transit link between downtown and the Northeastern Waterfront/Fisherman's Wharf. The F-line would be scheduled to provide sufficient capacity to absorb the annual increase in trips between downtown and Fisherman's Wharf and to carry the additional riders traveling between Mission Bay/South Beach and the Northeastern Waterfront (G. Bloom, PUC Bureau of Finance, 1988). The environmental impacts of the F-line project will be detailed in an Environmental Assessment currently being developed by the San Francisco Public Utilities Commission.

CHAPTER 5

5. EVALUATION OF ALTERNATIVES

5.1 SERVICE IMPROVEMENTS

The Surface and Underground Alternatives, Alternatives 1 and 2, provide a more efficient turnback system to reverse Metro trains traveling in the Market Street subway. As a result of the improved turnback system, MUNI will be able to schedule an additional eight to ten trains traveling in the subway during the peak hour. The additional trains would provide sufficient capacity to accommodate existing and projected peak period demand through the year 2007.

The Transportation Systems Management and No-Action Alternatives, Alternatives 3 and 4, do not adequately improve the turnback operation in the Market Street subway to operate significantly more trains than is currently scheduled during the peak. Although the TSM Alternative may allow a slight increase in the number of trains scheduled, neither alternative can be expected to provide sufficient capacity to meet City or ABAG demand projections for the year 2007.

5.2 SUMMARY OF POTENTIAL SIGNIFICANT IMPACTS

The following section summarizes the most significant mitigated and unmitigated impacts for each Turnaround Project alternative, particularly those that differentiate alternatives. Short term impacts define those created by construction of the build alternatives. Long term impacts relate to those effects resulting from operation of the Turnaround Project.

5.2.1 UNMITIGATED SIGNIFICANT IMPACTS

Surface Alternative. This alternative would create unmitigated visual impacts during construction. Long term unmitigated impacts include (1) traffic impacts, particularly at Mission/Embarcadero, related to the closure of the Howard and Harrison intersections at Embarcadero to left turning traffic under the Surface Alternative; (2) increased risk of accidents involving Metro vehicles at all intersections that would have either pedestrian and/or vehicle cross traffic as required under the Surface Alternative; (3) the incompatibility of the Advanced Train Control System with surface turnback operation; and (4) the violation of the eight hour CO standards at the Mission and Folsom intersections at Embarcadero will be exacerbated under the Surface Alternative. Additionally, the Surface Alternative could not meet project objectives related to community acceptance, minimizing land use impacts and conforming with existing City plans and policies.

Underground Alternative. This alternative would create unmitigated visual impacts during construction. However, the Underground Alternative produces no unmitigated long term effects. All project objectives can be met under this alternative.

Transportation System Management Alternative. Although no short term effects would be created under this alternative, none of the project objectives, except improving Metro operating reliability, could be accomplished by solely employing TSM measures. The goal of accommodating Year 2007 ridership demand could not be met and would force potential Metro riders to use other forms of transportation. Since the use of private autos would be the most likely alternative to MUNI Metro, long term impacts related to deteriorated traffic circulation, reduced intersection Level of Service, diminished air quality, and lack of available parking could be expected. These impacts could not be mitigated. Additionally, by not accommodating projected demand, the City's Transit First policy would be undermined.

No Project Alternative. The No Project Alternative would create long term, unmitigated effects similar to those described in the TSM Alternative. However, since the No Project Alternative would not provide Metro capacity or operating reliability improvements, the traffic and air quality problems resulting from unmet MUNI demand would exceed those associated with the TSM Alternative.

5.2.2 SURFACE ALTERNATIVE

Short Term. Construction would extend south to Bryant Street disrupting traffic and pedestrian circulation at three intersections, Folsom/Embarcadero, Harrison/Embarcadero, and Bryant/Embarcadero, that would not be affected by the other build alternative. The cut and cover excavation would require support and stabilization for the Embarcadero Freeway piers and displace 120 Port of San Francisco parking spaces for up to 36 months. Major telecommunication vaults lie in the path of the portal structure; relocation may be costly.

Long Term. Both the Surface and Underground Alternatives provide the operational capability of running 30 trains per hour in the Market Street subway thus accommodating projected 20 year demand. However, with the Surface Alternative, two surface turnback areas create visual and noise intrusions on the surrounding land uses, particularly at the future Rincon Point waterfront park and the Bayfront Promenade. Surface turnback operation, which requires a broadened roadway, would disrupt pedestrian flow across The Embarcadero, impede access to Piers 24, 26, and 28, and detract from the waterfront environment and activities. Queuing of traffic at signalized intersections preempted in favor of MUNI Metro could also occur. Because of the portal location immediately north of Howard Street, Howard Street would be closed to cross traffic at The Embarcadero. To expedite the flow of MUNI Metro vehicles, Harrison Street would also be closed to left turning traffic. As a result, northbound traffic along The Embarcadero would require two left turn lanes at Mission Street. Since the Embarcadero/Mission intersection is expected to be at capacity during peak periods by Year 2000, additional left turning vehicles could not be accommodated. The resulting queues and stop and go conditions would affect Mission Street circulation at Steuart, thus impeding MUNI use of the turnaround facility at Mission/Steuart.

Surface turnback operation would also produce queuing of traffic at Folsom aggravating the localized CO emissions at this intersection and creating risk of MUNI related accidents. Metro operating reliability would be diminished and the effectiveness of Automatic Train Operation reduced. These impacts cannot be mitigated.

5.2.3 UNDERGROUND ALTERNATIVE

Short Term. Cut and cover excavation would occur over a longer and wider area, presenting slightly greater risk for cracking of facades of adjacent buildings and affecting greater numbers of Embarcadero Freeway support piers. The cut and cover section could take approximately four months longer to complete than the Surface Alternative. One hundred forty-one Port parking places would be displaced for a maximum of 40 months. Because of the south of Howard portal location, a sewer line may need relocation and access across The Embarcadero at Howard Street would be temporarily disrupted.

Long Term. In addition to providing the requisite capacity gains in the Market Street subway, the Underground Alternative completely conceals turnback operation, thus eliminating visual and noise disturbances to adjacent land uses. Although a surface tail track crossing Folsom would be utilized for temporary storage of disabled trains, the frequency of train movements on the surface would be relatively insignificant compared with the Surface Alternative. Therefore, pedestrian access and traffic circulation would not be impeded. However, the portal location near the future Rincon Point park may intrude visually on the parkscape. Impacts, under this alternative, can be mitigated.

5.2.4 TRANSPORTATION SYSTEMS MANAGEMENT ALTERNATIVE

Short Term. None

Long Term. TSM improvements could increase the number of trains per hour in the Market Street subway, but could not provide sufficient capacity to meet projected demand, a primary goal of the City's Downtown Plan and Transit First policy. At best, with the installation of Automatic Train Operation, MUNI could operate 25 trains per hour and maintain schedule reliability. This level of service is insufficient to meet projected demand which requires a minimum of 30 trains per hour. Because ridership growth could not be accommodated under this scenario, people would have to rely on autos and other forms of transportation to reach their destinations, further congesting downtown streets and contributing to air pollution. These project impacts are unmitigated.

5.2.5 NO-ACTION ALTERNATIVE

Short Term. None.

Long Term. The existing crossover and turnback facility at Embarcadero Station allows a maximum of 22 trains per peak hour to operate in the Market Street subway. This level of service would be the least successful of all alternatives in accommodating projected demand.

5.3 CAPITAL AND OPERATING/MAINTENANCE COSTS

The capital cost (1988 dollars) to construct the Surface Alternative is nearly $20 million less than to construct the Underground Alternative (see Table 2.4-1). The lower cost for the Surface Alternative is a result of bringing the tracks to the surface as quickly as possible, thus minimizing the amount of costly cut and cover excavation required. When escalation of capital costs is considered, the difference in capital costs between Alternatives 1 and 2 increases from $19.869 to $30.427 million. The cumulative difference in annual operating expenses, which favors the Underground Alternative by $1.22 million to $1.85 million (1993 dollars), grows to $31 million over a 22 year period (see Table 4.3-3). Thus, the lower capital cost of Alternative 1 would be balanced by higher O&M costs in approximately 22 years.

The total cost of the alternatives may be compared utilizing UMTA's guidelines for annualizing costs. In this method, all initial capital costs are converted to annual costs and added to the O&M costs to yield a total cost (see Table 4.3-2). With this approach, the Surface Alternative is favored by $1.542 million per year ($10.162 million for the Underground Alternative compared with $8.620 million for the Surface Alternative).

There are additional cost factors associated with the construction of either alternative. The construction of the Surface Alternative would displace 120 parking spaces and the estimated revenue loss to the Port of $152,000. The construction of the Underground Alternative would displace 141 parking spaces and the estimated revenue loss to the Port of $371,300. Additionally, rewiring the trolley turnaround at the foot of Mission Street would cost approximately $250,000. These costs have already been included in the capital cost estimate.

Since much of the Surface Alternative is exposed on surface track, there is potentially greater risk for increased claims against MUNI and the City and County of San Francisco (i.e., personal injury claims, vandalism, and noise and visual intrusion claims by residences). Although the claims costs cannot be determined at this time, these potential costs may adversely affect the City's insurance rating and add to potential budget deficits.

5.4 LOCAL PRIORITIES FOR RAIL MODIFICATION PROGRAMS

The MUNI Metro Turnaround Project is at the top of the capital priority list in the Municipal Railway Capital Improvement Program 1987-92. The Regional Transportation Improvement Program also ranks the Turnaround Project as number one (Resolution #1815, Metropolitan Transportation Commission, May, 1987).

5.5 SELECTION OF THE LOCALLY PREFERRED ALTERNATIVE

5.5.1 SELECTION PROCESS

On October 25, 1988, the San Francisco Public Utilities Commission (PUC) approved Resolution #88-0374 that selected the Underground Alternative as the locally preferred alternative for the MUNI Metro Turnaround Project (see Appendix D). The PUC resolution culminated PUC/MUNI staff evaluation of the Draft EIS and public comments received through written submittal and oral presentation to the PUC at the public hearing on October 4, 1988. The written comments included a memorandum from the San Francisco Planning Commission stating that the Underground Alternative is consistent with the Master Plan and that the Surface Alternative is inconsistent with specific master plan objectives and implementing actions (see Appendix D).

The Draft EIS and public comments were reviewed by the PUC staff Capital Program Working Committee, which recommended the Underground Alternative to the Capital Program Management Committee, composed of PUC and MUNI managers.

The managers unanimously endorsed the Underground Alternative at their October 13, 1988, meeting and forwarded their recommendation to the PUC along with supporting information and a summary of public comments.

5.5.2 EVALUATION CRITERIA

In making their selection of the locally preferred alternative, the Public Utilities Commission analyzed several factors to determine the advantages and disadvantages of each alternative. The factors were:

1. Meeting project objectives, particularly in accommodating 20 year ridership projections and in facilitating a southern extension of MUNI Metro to Mission Bay.

2. Capital and operating costs.

3. Capability to integrate with the proposed new Advanced Train Control System (ATCS).

4. Operational control of/potential delay factors to MUNI Metro system, including the opportunity to reduce coupling of trains at West Portal and Duboce Portal.

5. Conformity with City Master Plan, Port and Redevelopment Plans, and area Specific Plans.

6. Visual and noise impacts.

7. Associated traffic impacts.

8. Maintainability of capital improvements.

9. Public comments, community acceptability.

5.5.3 RATIONALE FOR CHOOSING THE UNDERGROUND ALTERNATIVE

In evaluating the four alternatives, the PUC found that the Underground Alternative, although requiring the greatest capital expenditure, was superior to the other alternatives in meeting project objectives and addressing issues reflected in the evaluation criteria. Specifically, the Underground Alternative would expedite turnback operation of MUNI Metro trains at the easterly end of the Market Street subway, would permit MUNI Metro to accommodate a 20 year ridership growth, and would facilitate construction of a southern extension of MUNI Metro to Mission Bay. Neither the No Project nor TSM alternatives could meet these project objectives and, therefore, were eliminated as viable options.

Although many project objectives could be accomplished under the Surface Alternative, this alternative would not respond to the evaluation criteria as well as the Underground Alternative. For example, both build alternatives are designed to accommodate projected peak period demand--30 trains an hour. However, because of the underground's exclusive right-of-way and anticipated use of advanced train control, capacity would be increased to 36 trains an hour, while the surface alternative is limited to 30 trains an hour.

Therefore, the underground turnback allows for an incremental capacity increase of one-half as opposed to one-third with a surface treatment. That marginal difference would provide greater flexibility in train dispatching and thus improved reliability, schedule adherence, and reduced overcrowding.

Additionally, the Underground Alternative was found by the San Francisco Planning Commission to be in conformance with the City Master Plan. The Surface Alternative would be inconsistent with certain Master Plan objectives, particularly in terms of waterfront urban design, pedestrian access and additional traffic impacts resulting from surface turnback operation. The Planning Commission, as well as the Redevelopment Agency, the Port, and private developers, expressed concern that surface turnback operation of MUNI Metro along The Embarcadero between Howard and Bryant would affect access from their respective developments to the Bayfront Promenade, future Ricon Point park, and port activities at Pier 24-26. Additional noise and visual intrusion related to the portal location adjacent to the historic East Street Row buildings and to the surface turnback operation between Howard and Folsom were also cited as disadvantages of the Surface Alternative.

Although the Surface and Underground Alternatives share one short term, unmitigated impact, visual effects related to construction activities, the Underground Alternative has no unmitigated, long term impacts. The Surface Alternative, on the other hand, produces four significant, long term effects that cannot be mitigated (see Section 5.2.1).

City agencies noted that traffic movements along the Embarcadero Roadway would be restricted under the Surface Alternative since the median of the Harrison and Howard Street intersections would be closed to left-turning vehicles, thereby funneling left turn movements from The Embarcadero onto Mission Street. The Mission/Embarcadero intersection is forecasted to be operating at Level of Service F during peak hours without the Turnaround by the year 2000 (see Table 4.4-1). The additional left turning traffic would aggravate the congested conditions in The Embarcadero/Mission area and, because of queueing vehicles and slow moving traffic, could be expected to affect movement of MUNI vehicles accessing the bus turnaround facility one block west at Steuart and Mission.

In addition to the possible delays to bus operation on Mission, MUNI Metro operation could also experience delays at Folsom Street under the Surface Alternative. The potential delays would result from left turning traffic and pedestrians crossing the tracks at Folsom/Embarcadero. Although signal preemption would favor MUNI Metro at this intersection, rush hour traffic could be expected to slow train movements, thereby increasing Metro running times and enhancing the risk of accidents involving MUNI vehicles (see Figure 4.4-3).

Additionally, under the Surface Alternative, control and management of Metro operations would be more limited than with the Underground Alternative since the new Advanced Train Operation System could not be utilized for surface turnback operation. Because of manual surface turnback operation and cross traffic at Folsom Street, MUNI Metro would experience delays under the Surface Alternative, particularly at rush hour. The delays resulting from surface turnback operation could affect schedule reliability throughout the MUNI Metro system and preclude the possibility of reducing coupling of trains at West Portal and Duboce Portal.

Because the surface turnback operation would occur in two distinct zones along The Embarcadero, maintainability of the surface facilities would be more costly than a more compact underground turnback. Added costs would also be generated by the increased operating time associated with the surface turnback operation (estimated at $.44 million per year over the operating costs for the Underground Alternative) and by the requirement for two additional rail vehicles to service the Surface Alternative.

In support of the PUC selection of the Underground Alternative, public comments overwhelmingly favored the Underground Alternative over the Surface Alternative. Public comments can be found in Chapter 7.

5.6 CAPITAL FUNDING PLAN

The capital cost (1988 dollars) of the locally preferred alternative is $91,883,000 including the following quantified miscellaneous costs: loss of parking revenues to the Port of San Francisco and costs to rewire, on an interim basis, the MUNI trolley bus turnaround at Steuart and Mission Streets.* The construction financing for MUNI Metro Turnaround Project would be from three sources: Federal, State and local funds. The PUC intends to request discretionary UMTA Section 3 grant funds (Federal) to finance 75 percent of grant eligible project costs. The remaining 25 percent would be financed by a mix of State and local funds. Discretionary State Guideway Program funds would finance roughly half of the remaining 25 percent non-Federal funded project costs. The local share would finance the remaining non-Federal funds in addition to those costs that would be designated as non-grant eligible costs. Local funding could be composed of a number of sources including regional funding administered by MTC, such as STA and Bridge Tolls net revenues, or from local sources such as SFMRIC, TIDF, General Fund or Hetch Hetchy capital resources (see Section 3.3.2).

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* Potential miscellaneous costs are being determined by the San Francisco Public Utilities Commission and will be added to the total capital costs of $91,883,000. The total capital cost is then escalated to reflect inflationary factors over the final design, engineering, and construction period.

CHAPTER 6

6. COMMITTED MITIGATION MEASURES FOR THE LOCALLY PREFERRED ALTERNATIVE

The San Francisco Public Utilities Commission has committed to implement the following mitigation measures to reduce impacts related to the construction and implementation of the locally preferred alternative, the Underground Alternative, to a level of insignificance. The committed mitigations are arranged by subject area and are identified as short term (construction related) or long term (operation related). The Underground Alternative has one unmitigated short term impact, visual effects of construction activities. All other significant impacts associated with this alternative can be mitigated. Monitoring of mitigation measures will be the responsibility of the City of San Francisco.

6.1 LAND USE

SHORT TERM. Emergency access and pedestrian access to affected properties will be maintained to buildings during the construction. East Street Row buildings will have emergency access from The Embarcadero and pedestrian access from Steuart Street. Vehicular access will be maintained to Pier 22 1/2, the Fire Boat Station, and all Port of San Francisco pier facilities in the construction area. Financial compensation will be provided for the loss of parking revenue during construction.

Construction procedures will include preconstruction surveys of affected buildings and structures as well as monitoring potential building settlement and cracking during construction. Construction procedures will be modified as required to minimize potential impact. Potential cracks in building facades and features resulting from construction will be repaired as required.

6.2 ECONOMIC AND FINANCIAL

SHORT TERM. The Port of San Francisco will be compensated for loss of parking revenue based on San Francisco Port Commission Resolution No. 87-96. Additionally, the contractor will provide continued access across the cut and cover excavation to the Agriculture Building and Piers 24, 26 and 28. Construction activities will be scheduled to limit conflicts with scheduled events at Justin Herman Plaza.

The temporary rerouting of trolley lines at the bus turnaround (Steuart/Mission) will be required at a cost of $250,000 for new trolley wire.

6.3 TRAFFIC AND TRANSPORTATION

SHORT TERM. In order to mitigate construction related impediments to circulation in the project area, the following mitigation measures are proposed:

- Through traffic movements along The Embarcadero will be maintained during construction. Intersections along the cut and cover excavation in the Embarcadero Roadway will be covered (decked) temporarily to allow vehicle and pedestrian circulation to the activities along the waterfront. Specifically, decking of the Mission Street/Embarcadero and Howard/Embarcadero intersections will provide access to the Agriculture Building and the Bayfront Promenade.

- Notices of construction will be posted along The Embarcadero and delivered to each building in the project area. The City's Chief Administrative Officer is coordinating construction activities for the Embarcadero Parkway and the Turnaround Project. An office will be established in the project area to inform the public of waterfront projects and their impending construction schedule.

- Continued access to the buildings along the east side of The Embarcadero between Mission and Howard Streets, particularly for pedestrians and emergency vehicles, will be provided. Additionally, a temporary, substitute turnaround loop for MUNI buses using the portion of the existing turnaround facility at Mission and Steuart Streets not used for construction will be installed. Interim facilities for operator layovers will be relocated to outbound terminals. No alternative routes will be required since temporary detours and decking of excavated areas will allow maintenance of basic traffic circulation patterns and capacity.

6.4 URBAN DESIGN

SHORT TERM. There are no mitigation measures identified for the short-term visual impact associated with the viewing of construction equipment and activity.

LONG TERM. The Underground Alternative would not require mitigation measures for train operations, related barriers and pedestrian control systems or various lighting and utilitarian elements. There is no mitigation measure identified for the blockage of views during periods in which the disabled track is in use.

Right-of-way requirements for the Underground Alternative are generally less than for the Surface Alternative. For example, between Harrison and Bryant Streets the Turnaround Underground Alternative right-of-way requirements are approximately 18 feet less than the requirements for the Surface Alternative.

Materials: The bollards should be nautical in character. Precast concrete is an economical choice for the bollards and will give them a substantial quality similar to stone. The cable will also be substantial and could be stainless steel.

The Metro track bed will be paved in typical asphaltic concrete (AC) along the boulevard stretches. AC is a more flexible material than concrete, which can crack from the heavy, repetitive train loads and the vibrations. AC can contrast, and therefore demark, non-pedestrian areas, such as track beds and auto pavement. Brick pavers or other high quality and durable materials will be used for pedestrian crosswalk areas. The mid-block crossing at Hills Plaza should be paved to function as an extension of the Plaza paving at the base of the Hills Brothers tower. The area would then join Hills Plaza, Bayfront Promenade, and adjacent maritime structures. The median will be lined with trees. Tree planting along the median will help to screen overhead wires and will provide a sense of continuity along this segment of the waterfront. See MUNI Metro Turnaround Embarcadero Roadway Urban Design Study (Reference Document No. 11) for an overall treatment of street trees in the project area in conjunction with the Embarcadero Roadway improvements.

Portal: The parapet walls of the portal will be low to minimize the potential view blockage. Glass block will be considered for the parapet walls to give a sense of transparency. A decorative steel fence consistent with the wall design will be considered. Alternative treatment for the wall includes use of a decorative all-steel fence to minimize potential for the portal structure to block views. Tree planting along the median in the area of the portal will aid in screening views from the upper floors of developments west of the Embarcadero Roadway (see Figure 4.5-12).

Ventilation Structures: The location and appearance of the ventilation structures will be carefully considered. When the Embarcadero Roadway is realigned, a new area will open up for design near the bus turnaround and Justin Herman Plaza. The ventilation structures could be located somewhere in this area and used as a structural element. Rather than constructing plain, utilitarian ventilation structures, there is an opportunity to design ventilation structures that complement the plaza.

Design treatments suggested for mitigation of the Turnaround impacts will be consistent with the Urban Design Guidelines for the Embarcadero Roadway Project.

6.5 AIR QUALITY

SHORT TERM. The suggested mitigation measures are limited to construction phases and intended to reduce localized increases in total suspended particulate emissions (BAAQMD, "Dust Control Required Measures" (1983). These supplementary City requirements are listed in the Building Code.

Trucks will be kept off dirt areas and will be kept on paved or graveled roads to the extent possible to minimize road dust. In addition, spray bars will be used at construction area access points to wash wheels and undercarriages of trucks. If water cannot be sprayed due to drought conditions, dust palliatives will be applied on construction areas to control fugitive dust. Dump truck loads will be covered with canvas or tarps when hauling excavated material of fill to control dust; and paved areas will be vacuum sweeped in a manner that does not entrain excessive dust.

6.6 NOISE

SHORT TERM. The following mitigation measures will reduce the temporary adverse impacts associated with construction activity:

> All construction related vehicles and equipment will be properly muffled in order to minimize the noise impact of construction, and where pile driving operations are conducted, holes will be predrilled.
>
> In addition, construction activities at the project site will be carried out Monday through Friday between the hours of 7 A.M. and 6 P.M. to minimize disturbance to local residents.

The public and adjacent property owners will be informed in advance of proposed construction timelines to minimize potential annoyance related to construction noise. Notices will be posted along The Embarcadero and delivered to buildings located in the project area. Advance notification is particularly important for receptors located within a few hundred feet of construction activity.

The construction noise impacts affecting the Justin Herman Plaza will be mitigated by the use of six foot or higher solid fencing as a temporary barrier along portions of the south and east boundaries of the park. Potential visual or shadow effects of the fence could be reduced by the use of plexiglas or equivalent material instead of wood. Also, consideration will be given to the use of plantings along the fence or possible decorative murals for aesthetic enhancement.

The contractor's operations will conform with all City Ordinances, specifically Article 29 of the San Francisco Police Code, Regulation of Noise.

LONG TERM. To mitigate the sound level impacts which will be created by the tunnel exhaust fan, an appropriate sound attenuator will be provided. The attenuator will provide a sound level reduction of 30 dBA so that the fan sound level will not exceed 60 dBA at the Justin Herman Plaza. A solid structure, such as one made with concrete block and six feet high, will enclose the fan in order to reduce noise levels significantly.

6.7 ENERGY

SHORT TERM. Local sources of gravel, track bed and other fill material will be used, consistent with supply and cost constraints, to minimize haul trip lengths.

6.8 CONSTRUCTION METHODS

SHORT TERM. Soldier Pile Tremie Concrete Slurry Walls (slurry walls) will be installed prior to the main excavation to prevent drawdown of the groundwater outside of the excavation, and to minimize the vertical heave at the base of the excavation and the resultant settlement and lateral movement of soil adjacent to the excavation. The slurry walls will be very stiff (36 inches wide with steel piles every five feet), deep (30 feet below bottom of excavation), and heavily braced at ten foot intervals.

Special excavation methods and equipment, including the possible use of special low headroom equipment developed by the Japanese, will be utilized to excavate the slurry wall trench through the rock sea wall. Soldier piles will be installed in predrilled holes through the sea wall.

To support the Embarcadero Freeway structure during construction, bent column pick-up structures will be employed. The pick-up structure will be prefabricated steel stanchions installed directly under the support points of the Embarcadero Freeway girders and properly tied to the concrete column for lateral stability. The pick-up structure will be mounted on a steel grillage, through a series of hydraulic jacks, thus transferring vertical loads to the newly installed underpinning piles.

The uppermost tier of cross-bracings will serve as beams for the support of a heavy timber deck to be constructed where ground level traffic interrupted by the construction work needs to be maintained.

An instrumentation program to monitor surface settlements, groundwater, stresses, and strains will be employed throughout the construction operation. Limits and contingency plans will be established prior to construction to define conditions when the construction should be modified or halted. Additionally, a restoration program for repair of surface improvements and minor external damage to buildings has been budgeted and will be implemented by the construction contractor.

To assure the full design capacity of the BART tunnel lining, it is anticipated that part or all the bolts in the first 450 feet of both BART tunnels east of the Spear Street Ventilation Shaft will have to be exchanged. It is also anticipated that lead caulking in the caulking grooves of the linings will have to be used to stop increased leakage resulting from the MUNI tunnel construction.

Remedial work will also be required at the BART tunnel seal at the Spear Street Ventilation Shaft. This work may include replacement of parts of the seal assembly and grout injection behind the seal to stop water inflow. Grout injection outside of the lining throuugh existing grout plugs may also be considered in the areas of the tunnel to stop persistent leaks. Additional pumps will be installed at the Spear Street Shaft.

The most critical design considerations are development of methods for locating, cutting and removing existing piles with sufficient care to assure minimum disturbance of the BART tunnels and control of the tunneling at the fill clay boundary. A Tunnel Construction Monitoring Program will be designed and implemented to monitor construction performance. Soil deformation and settlement, tunnel lining strain, and tunnel lining joint opening will be monitored and compared to allowable values established by analysis and experience. Reference survey monuments and benchmarks will be established underground and on the surface to monitor surface and tunnel subsidence and diameter deformation. At the outset of MUNI tunneling, before the tunnels reach the BART tunnels, a Test Section Monitoring Program will be implemented which will confirm the predicted and specified tunneling performance before tunneling reaches the critical area over the BART tunnels.

Contingency construction modifications will be developed ahead of construction to deal with unacceptable deformation of BART tunnels or connecting bolt breakage. Loss of compressed air, inflow of water, loss of ground at the tunnel face, difficulties in pile removal, power or utility failure will also be addressed.

A remedial repair program will be implemented by the construction contractor to repair minor damage to surface improvements, utilities, and buildings affected by the tunneling.

Sheet piles will be installed in preexcavated trenches through the rubble fill and rock sea wall. Trench walls will be supported by a bentonite slurry. The sheet piles are driven 20 feet below the base of the excavation to prevent seepage.

All construction work will be done in accordance with current building code requirements. Critical construction operations such as major excavation, bracing, and concrete pouring will be done in phases to limit the amount of partially completed work exposed to earthquake damage. Tunnel face support will be required to minimize damage to the excavation face. Back up power will be provided for all critical operations such as tunneling under compressed air.

Fill material at the crown of the tunnel will be grouted prior to tunneling to stabilize the soil and to prevent liquefaction. Grouting or densification of loose sandy fills below the U-wall sections can stabilize these soils and limit vibration induced settlements to tolerable amounts.

Flexible type surface track work will be used, and adjustable rail fasteners will be installed in the subway structures to facilitate realignment of track.

The high pressure water line in Market Street may require relocation to an area outside the tunnel envelope to avoid subsidence. The 12 inch high pressure water line in Mission Street crosses an area where the tracks will be relatively deep. This facility, as well as waterline crossings of surface track construction, can be supported in place.

A primary concern with telephone facilities is maintenance of services. Both major communication lines to the financial area and transcontinental lines are located in the project area. The diagonal crossing north of Market Street occurs at a point where the tracks are relatively deep. It would be desirable to support the duct banks in place with extreme care taken to avoid damage.

Protecting the Pacific Bell duct banks at Howard Street will be explored with Pacific Bell, requiring careful potholing of the facilities to verify their depth.

The electric duct banks are parallel and closely aligned to the telephone facilities. The crossing south of Market Street should be handled in a manner similar to that of the telephone facilities.

The 36 inch sewer force main and 7 foot 6 inch sewer cross the cut and cover area in Howard Street and appear to encroach into the tunnel area by about one foot. As a result, cut and cover construction could damage the sewer line.

LONG TERM. Normal maintenance (street repaving) should readily accommodate any impact of the differential settlements between subsiding ground and the non-settling MUNI structures. MUNI rails will be mounted on resilient rail fasteners similar to those used in the existing subway.

Minor remedial work may be required to correct long term surface settlement and leakage in BART tunnels.

All new MUNI underground structures will be designed in accordance with the current state of the art of seismic design. All underpinning of the Embarcadero Freeway will be done in accordance with current CALTRANS seismic requirements.

6.9 WATER RESOURCES

SHORT TERM. The following measures will reduce the surface water runoff/water quality impacts from construction of the Underground Alternative.

Appropriate erosion control devices will be utilized to retain sediment within the project area during the construction period. In addition, excavation operations will be evaluated and inspected periodically by a qualified soils engineer to determine effectiveness of erosion control techniques. Also, additional maintenance work to clean storm drains and siltation basins may be required during construction.

Partial mitigation of settlement impacts will involve the implementation of slurry walls and no dewatering of areas behind the walls or below the excavation. Careful monitoring of groundwater conditions and soil movements will be implemented during construction, and modifications of construction procedures be made, if required, to limit movements to tolerable amounts.

Extracted groundwater with contaminant levels below minimum allowable standards will set in sedimentation tanks prior to disposal into the storm/sewer system. Also, extracted groundwater with contaminant levels in excess of minimum allowable standards will be disposed of off-site in an appropriate manner.

6.10 BIOLOGY

SHORT TERM. Any trees removed during the construction process will be replaced with trees of suitable type, size, and density. Replacement trees will have low maintenance requirements and will be visually aesthetic and will be types specified by the City of San Francisco Parks and Recreation Department. Trees will be planted along the median of the Parkway in the vicinity of the portal to aid in screening views from the upper floors of developments west of the Embarcadero Parkway.

Temporary fencing will be placed around trees during grading and construction activities to prevent inadvertent damage. Construction within the dripline of mature trees will be avoided to the maximum extent feasible. Also, grouting material chosen will be chemically stable to avoid any possible harm to existing vegetation in Justin Herman Plaza.

6.11 HAZARDOUS MATERIALS

SHORT TERM. Due to the varied nature of hazardous materials, many mitigation options are available. In the case of fuel contaminated soils, the process of aeration and/or biodegradation will substantially lower the fuel concentrations. Where fuels exceed 100 ppm and/or floating product has been observed on top of the groundwater, groundwater monitoring wells are necessary first to delineate the contaminant plume in the groundwater and then to begin a remedial action program that extracts and treats the contaminated groundwater so as to reduce concentrations. Groundwater monitoring will occur during final design. In the case of solvents, any detectable concentration requires the same action.

The heavier petroleum hydrocarbons such as oil and grease are difficult to biodegrade but can sometimes be recycled or excavated and off hauled to a Class II or Class III disposal dump site.

In the case of heavy metals in soil, removal and transport to a Class I dump site is sometimes required. The State will not allow disposal in Class I dump sites after May 8, 1990. There are alternative technologies that can fixate metals in soils, and these will be explored if needed for project mitigation.

6.12 HISTORICAL AND CULTURAL RESOURCES

SHORT TERM. Construction methods will be utilized that maintain ground stability during excavation. Construction procedures will be monitored for building settlement during construction. Construction procedures will be modified, if required, to limit movements to acceptable amounts. Any cracking induced by construction will be patched as required. Funding will be provided for work identified.

A qualified archaeologist will be retained to prepare a construction monitoring program and monitor excavation work. The archaeological monitoring program will be coordinated with the State Historic Preservation Office (SHPO) in accordance with the MOA. Construction contracts will include "time buffers" to minimize potential impact on the construction schedule. Below grade, support walls of the Turnaround structure will be kept at least 30 feet from the East Street Row buildings.

LONG TERM. The Department of Public Works requested a Determination of Eligibility for the Belt Line Railway in conjunction with the Embarcadero Roadway Project in April 1988. In May 1988,, CALTRANS informed the Department of Public Works that SHPO has already concurred with the Determination of Eligibility for the Belt Line recommended by CALTRANS in conjunction with the I-280 EIR. Pending is a request by the Department of Public Works for a joint Belt Line clearance for the related transportation improvement projects (Turnaround, Embarcadero Roadway, Historic "F" Line). A joint mitigation program, coordinated by San Francisco Department of Public Works and Public Utilities Commission, is planned for related Belt Line impacts.

Specific mitigation measures for the Belt Line will be developed as a part of the Embarcadero Roadway Project.

UMTA, in consultation with the SHPO, has determined that the Old Seawall is potentially eligible for the National Register of Historic Places. Proposed mitigation for the Old Seawall includes: Demarcate line of the Old Seawall through the Turnaround Project area with "red line" to illustrate the relationship of the Old Seawall in the William Eddy "Red Line" Survey of San Francisco; prepare historical marker(s) to place in pavement along this line explaining the purpose, design and construction, and historical significance of the Old Seawall in San Francisco; recover rocks from the Seawall structure and construct a structure in the project area from these rocks or incorporate Old Seawall rocks in pavement areas; construct a model of the Old Seawall utilizing Seawall rocks.

6.13 PARKLANDS

SHORT TERM

Justin Herman Plaza. The emphasis for mitigation at this site would be (1) to minimize the short term temporary construction impacts of pollutant and particulate emissions and noise impacts upon the public who use and enjoy the plaza especially during the noon lunch period between 12:00 P.M. and 1:30 P.M.; and (2) to minimize any potential impact of grouting upon landscaped trees and plants within Justin Herman Plaza.

Spray water or spray dust palliatives and vacuum sweep paved areas to control dust, if spraying of water is not permitted due to drought conditions. Also, dump truck loads will be covered with canvas or tarps when hauling excavated fill material to control dust. In addition, trucks will be kept off of dirt areas and on paved surfaces to minimize road dust. Excessive idling of gasoline and diesel powered construction equipment will be avoided in order to minimize the temporary increase in pollutant emissions from this equipment.

The timing of construction activities within the Plaza will be coordinated with the San Francisco Recreation and Parks Department to coincide with a time period of little or no activities planned for the Plaza. This measure will reduce the amount of potential revenue loss to the Recreation and Parks Department since they can schedule events and activities ahead of time.

A six foot high temporary acoustical barrier will be installed along the property line in the vicinity of the southeastern corner of the Plaza, specified by the City of San Francisco Recreation and Park Department. This barrier will reduce the construction noise impacts of the cut and cover construction in the Embarcadero Roadway to an acceptable level (between 72 and 80 decibels) so that the public will be able to use the Plaza during the noon lunch hour and for scheduled events and activities. Also, to the extent possible, construction activity within Justin Herman Plaza and the vicinity of the plaza will cease during the noon lunch period between 12:00 P.M. and 1:30 P.M. in order to not distuurb people who use the Plaza for lunch. Also in order to reduce noise impacts from construction activities, the diesel driven air compressor will be located as far away as possible from the parkland and will be provided with temporary shielding around it.

A clay mixture (bentonite) grout, rather than a cement or chemical grout, will be used during the grouting process. Also, if any trees or plants are damaged or disturbed by the grouting process they will be replaced with trees and plants of suitable size, type and density to provide visually aesthetic landscaping. These planting materials will be specified by the City of San Francisco Recreation and Park Department. In addition, upon completion of the drilling process, remedial action will be taken to restore the grass and soil where drilling holes have been emplaced.

Gradual subsidence of parkland over the proposed tunnel to as much as six inches could potentially affect drainage patterns, paved surfaces and create potentially hazardous conditions. As a mitigation, any affected area of the Plaza will be brought back to its original condition following construction and also following one year of postconstruction monitoring.

Bayfront Promenade and Bayside Plaza Building Open Space. The emphasis for mitigation at this site will be to minimize temporary construction impacts associated with noise, particulate and pollutant emissions, and access.

Spray water or spray dust palliatives and vacuum sweep paved areas to control dust if spraying of water is not permitted due to drought conditions. In addition, dump truck loads will be covered with canvas or tarps when hauling excavated fill material to control dust, and trucks will be kept off of dirt areas and on paved surfaces to minimize road dust.

Excessive idling of gasoline and diesel powered construction equipment should be avoided in order to minimize the temporary increase in pollutant emissions from this equipment.

Also in order to minimize noise impacts of construction, all construction equipment and related vehicles such as hauling trucks will be properly muffled. In addition, as part of standard construction procedures, temporary access will be provided across the Embarcadero Roadway by decking the roadway so that pedestrians can continue to get to the Promenade.

Temporary construction impacts will be reviewed as part of the Recreation and Park Department permit process.

LONG TERM. An appropriate sound attenuator will be provided so that the tunnel exhaust fan will not produce a sound level of greater than 60 dBA at the Justin Herman Plaza. (See Section 6.6, Noise.)

CHAPTER 7

7. SUMMARY OF COMMENTS ON THE DRAFT EIS

Comments received have been headed by letter as indicated in the Index of Comments Received. Each comment has been subcategorized to indicate critical points raised and to facilitate cross referencing of Responses to Comments presented in Section 8.

7.1 INDEX OF COMMENTS RECEIVED

COMMENT	RECEIVED	AGENCY/NAME
A	10/04/88	Bay Area Air Quality Management District
AA	10/10/88	Beta West
B	10/10/88	City of San Francisco, Department of Planning
C	09/20/88	City of San Francisco, Department of Public Health
D	10/07/88	City of San Francisco, Department of Public Works
E	10/03/88	City of San Francisco, Municipal Railway
EE	10/25/88	City of San Francisco, Police Department
F	10/07/88	City of San Francisco, Port of San Francisco
FF	10/14/88	City of San Francisco, Port of San Francisco
G	10/13/88	City of San Francisco, Recreation and Parks
H	10/10/88	City of San Francisco, Redevelopment Agency
HH	10/19/88	City of San Francisco, Redevelopment Agency
HHH	11/03/88	City of San Francisco, Redevelopment Agency
I	10/07/88	J-Dart
J	10/07/88	Jewish Community Federation
K	10/14/88	McLean Properties
L	10/10/88	Pacific Union Investment Corporation
M	09/12/88	State of California, San Francisco Bay Conservation Development Commission
MM	10/14/88	State of California, The Resources Agency of California

N	09/30/88	State of California, Office of Historic Preservation
NN	10/19/88	State of California, Office of Planning and Research
O	09/22/88	United States Army, Corps of Engineers
P	10/07/88	United States Environmental Protection Agency
PP	11/09/88	United States Department of the Interior
Q	10/10/88	Whisler-Patri
R	10/10/88	YMCA, Embarcadero
S	10/11/88	YMCA, Metropolitan
T	10/04/88	Public Testimony

7.2 COMMENTS RECEIVED

COMMENT A

BAY AREA AIR QUALITY MANAGEMENT DISTRICT

ALAMEDA COUNTY
Edward R. Campbell
Shirley J. Campbell
Chuck Corica
Frank H. Ogawa

CONTRA COSTA COUNTY
Paul L. Cooper
Sunne Wright McPeak

MARIN COUNTY
Al Aramburu
(Chairperson)

NAPA COUNTY
Harold I. Moskowite

SAN FRANCISCO COUNTY
Harry G. Britt
Jim Gonzalez

SAN MATEO COUNTY
Gus J. Nicolopulos
Anna Eshoo

SANTA CLARA COUNTY
Rod Diridon
Ralph P. Doetsch, Sr.
(Vice-Chairperson)
Roberta H. Hughan
Susanne Wilson
(Secretary)

SOLANO COUNTY
Osby Davis

SONOMA COUNTY
Helen B. Rudee

October 4, 1988

U.S. Department of Transportation
UMTA, Region IX
211 Main Street, Suite 1160
San Francisco, California 94105

Attention: Carmen C. Clark

Dear Ms. Clark:

We have reviewed the Draft EIS for the Muni Metro Turnaround Project. The proposed project is intended to speed the turnback of trains at the eastern terminus of the Market Street subway. The two build alternatives include a surface alternative, which would locate Muni turnback operations in the median of the Embarcadero Parkway between Howard and Bryant Street, and an underground alternative, which would locate turnback operations in a tunnel below the Embarcadero Parkway.

A.1 We generally favor transit improvements that improve service and encourage ridership. This support might be qualified if proposed improvements resulted in secondary adverse impacts. Table 4.4-1 of the DEIS indicates that the surface alternative would contribute to future traffic congestion along the Embarcadero Parkway and, possibly, elevated carbon monoxide (CO) concentrations at congested intersections. From an air quality viewpoint, the underground alternative appears to be preferable. If the surface alternative is pursued, we recommend that CO concentrations at congested intersections be modeled and, if necessary, mitigation measures be proposed.

A.2 Section 4.12, of the DEIS, indicates that there may be contaminated soils along the proposed alignments and that soil testing will be conducted. Please note that the excavation and clean-up of soils contaminated with organic compounds may be subject to BAAQMD Regulation 8-40. We recommend that a Muni representative contact our Enforcement Division at (415) 771-6000 for details. Any other questions should be directed to Henry Hilken of our Planning Division, at (415) 771-6000, extension 112.

Sincerely,

Milton Feldstein
Air Pollution Control Officer

MF/HH:mtm

939 ELLIS STREET • SAN FRANCISCO, CALIFORNIA 94109 • (415) 771-6000

COMMENT AA

BetaWest Properties Inc.
201 Spear Street, Suite 1010
San Francisco, California 94105-1634
415 777-5971

BetaWest.
A US WEST Company

October 10, 1988

Ms. Carmen Clark
Urban Mass Transportation Administration
211 Main Street, Suite 1160
San Francisco, CA 94105

Mr. Merrill R. Cohn, Project Mgr.
Public Utilities Commission
Utilities Engineering Bureau
1155 Market Street
San Francisco, CA 94103

Dear Madam or Sir:

Hills Plaza is a new mixed-use project fronting Steuart Street between Folsom and Harrison Streets. The Hills Plaza Project is currently under construction and consists of renovation of the existing Landmark Building and construction of a new mid-rise office/retail/residential complex with restaurant uses and parking facilities. A large landscaped plaza situated between the two buildings will provide a mid-block pedestrian passageway connecting the waterfront with residential development on Rincon Hill. The plaza will also provide a place for office workers and residents to eat lunch, relax, or enjoy the views of the Bay.

AA.1 In reviewing the EIS for the proposed Muni Turnaround, it is not possible to determine which alternative would be preferable since the EIS does not adequately discuss the impacts of either alternative on Hills Plaza. Specifically, the EIS should address the impacts of each alternative on pedestrian access to the waterfront, traffic circulation, noise impacts on the residential units, and views of the Bay from Hills Plaza. As developers of the Hills Plaza Project, we support improved transit to the area. We are, however, concerned that the proposed turnaround and future transit stops are sensitively designed.

Sincerely,

BETAWEST PROPERTIES, INC.

Gary W. Craft

Gary W. Craft
Project Director

GWC:cmm

COMMENT B

City and County of San Francisco
Department of City Planning

450 McAllister Street
San Francisco, CA 94102

ADMINISTRATION
(415) 558-6414
CITY PLANNING COMMISSION
(415) 558-6414
PLANS AND PROGRAMS
(415) 558-6264
IMPLEMENTATION / ZONING
(415) 558-6377

October 10, 1988

Ms. Carmen C. Clark
UMTA Region IX
211 Main Street, Suite 1160
San Francisco, CA 94105

Dear Ms. Clark:

Thank you for the opportunity to comment on the Draft EIS for the Muni Metro Turnaround Project. We have completed our review and have the following comments; organized by chapter, page, and paragraph:

Summary

	Page Number	Paragraph	Comment
B.1	S-5	6	The reference to displaced Port parking spaces is inconsistent with table S.4, the former cites 120 spaces lost for 36 months, the latter 121 spaces for eight months.
B.2	S-7	1	The Surface Alternative requires that both Howard Street and Harrison Street access from The Embarcadero be closed. The closure of Harrison Street is not mentioned as a long term impact. The impacts of diverting traffic to Mission Street, a Transit Preferential Street, need to be noted.
B.2A		4	The capacity increase provided by the TSM Alternative is not substantiated anywhere in this document. Since the TSM component is common to both the Surface and Underground Alternative, it is useful to know what capacity increases are attributable to just the TSM measures.
B.3	S-8	Traff/Trans Long Term	The elimination of access from The Embarcadero to Howard and Harrison Streets, the most critical circulation impact, is not noted.
			We request that the summary be reprinted with these and any other necessary changes so that decision makers have at least one complete and easily accessible document summarizing project impacts. San

Francisco produces a final environmental review document, with all revisions made, to make the document more useful to decision makers and the public. In the absence of a revised document, you should at least provide a revised Final Summary.

Chapter 1

B.4	1-2	4	Was a Draft EIS for the Market Street Subway - MUNI Track Extension finalized and if so when?
B.5	1-5		The table at the top of this page and following paragraph seem to indicate that necessary capacity for 20 year growth could be accomplished by operating improvements without the turnaround. The following section then seems to indicate that this theoretical capacity is not achievable, but it is not clearly stated why this is so. This is an essential point in the analysis since otherwise it is not warranted to select a build alternative with potentially significant impacts rather than a no-build/TSM alternative.
B.6	1-6	1	While the document is well written and generally free of overly technical references, the statement, "...replacement of moveable-point frogs with flange bearing frogs..." needs clarification for the lay reader.
B.7	1-7	3	Table 1.2-1 is still confusing due to the inconsistency in data presentation. If consistent data cannot be provided, then the text should note that the ABAG projections assume less employment growth for the downtown San Francisco area than the forecasts prepared by Recht Hausrath. This is why the ABAG numbers show fewer trips even with the extension. This table should be clarified and reprinted for better use by the public and decision-makers.
B.8	1-8	1	This future operating plan appears to be for the Surface Alternative. This should be noted.
		Table 1.2-2	This table should note for what time period the V/C is calculated.

Chapter 2

B.9	2-6	5	Future Operating Plan for the Surface Alternative is described in Section 1.2.2
		7	The traffic circulation implications for Underground Alternative are not noted in the description. The fact that this alternative retains access to both Howard and Harrison Street should be noted as it is one of the key advantages of this alternative.
B.10	2-8	2	The operational plan for the Underground Alternative indicates that the J trains would be turned on the underground pocket tracks. The operational plan for the Surface Alternative indicates that the J would run on the southern extension. Is this a mistake or is there an operational constraint in the Underground Alternative that prohibits the additional service to the south?

Chapter 3

B.11	3.1-11	3	Information regarding the Mission Bay proposal should be updated for the Final EIS to reflect the most current project.
B.12	3.4-1		We have previously requested that the Master Plan designations for each of the key streets in the study area be noted. This information has still not been included. Our foremost concern is that Mission Street is designated as a Transit Preferential Street and it is one of the most heavily utilized transit streets in the downtown, second only to Market Street. The Surface Alternative, which forces additional auto traffic onto Mission Street due to access restrictions to the south, is undesirable from a city perspective because it would encourage more traffic on this important transit street. This concern and disadvantage of the Surface Alternative has not been articulated in the EIS. This point should be included in the summary.
B.13		2	A V/C ratio greater than one is a theoretical expression of a condition where expected demand exceeds capacity. Practically speaking, the volume cannot exceed the capacity of a street. This concept should be made clearer (the description in Table 3.4-2 is good.)

B.14	3.6-1	4	This paragraph is unclear regarding which standards have been violated.
B.15	3.13-10	4	It appears that the reference to 1952 should be 1852.

Chapter 4

B.16	4.3-3	Sect.4.3.2	The prescribed method of fiscal analysis - annualized costs - presents too narrow a cost comparison between the two build alternatives. The initially higher cost of the Underground Alternative is recouped over a 22 year period as a result of lower operating costs. If the lifetime of the project is considered to be 50 years as indicated in Table 2.4-2, then over that 50 year period a cost savings would be realized with the Underground Alternative. This should be clearly stated.
B.17	4.3-4	1	Reference to number of parking spaces affected under each alternative is inconsistent with paragraph two.
B.18	Section 4.4		Generally, within the transportation discussion there are occasional references to closing the intersections at Howard and Harrison at The Embarcadero when in fact it is the median which would be closed, right hand (south) turns would still be permitted. This should be clarified.
B.19	4.4-3	8	It is stated that it is desirable to reconstruct the Bryant and Main Street intersections but it is not clear that this will occur nor what the implications are if this is not done.
B.20	4.4-4		Discussion of V/C ratios and LOS at intersections in the turnaround project area should clarify to what extent, if any, the turnaround project causes changes in LOS. It would also be useful to reiterate in the impacts discussion what the current LOS are at these locations.
B.21		Table 4.4-1	This table and its relationship to Table 3.4-1 is confusing. Do both the first and second columns in this table relate to Year 2000 conditions with a surface Muni operation? Exactly what condition does the first column represent? A reprint of this table with clearer column headings (or footnotes) would be helpful. What are the traffic conditions with an Underground Alternative?

B.22	4.4-6	4	The Long Term impacts section does not address why traffic diversion to Mission Street is undesirable, i.e. additional traffic on Mission Street will potentially disrupt transit service on this Transit Preferential Street. As indicated above, this is a critical issue.
B.23	4.4-8	3	The increased difficulty of pedestrian crossings on The Embarcadero resulting from the broader roadway in the Surface Alternative are not discussed.
B.24		8	The advantages for pedestrians owing to a narrower roadway cross section in the Underground Alternative are not discussed.
B.25	Section 4.5		It should be noted that the design treatments suggested for mitigation of the Muni Metro impacts should be consistent with the Urban Design Guidelines developed for The Embarcadero Roadway.
B.26	4.5-3	5	The discussion of barriers references various possibilities without presenting the selected barriers which are discussed in mitigation. It would be appropriate to cross reference the mitigation section here.
B.27	4.6-1	5	If the intersection changes and additional queuing caused by the turnaround project contribute to localized CO concentrations and possible violations, then a calculation of the extent of these concentrations needs to be made.
B.28	4.7-2	1	While the Noise Ordinance would not apply to the transit vehicles themselves, since there is no specific provision for a mobile noise source beyond the "Unnecessary, Excessive or Offensive Noise" or "nuisance" provisions of the ordinance, it would apply to the stationary operational noise caused by the exhaust fan. See Section 2909 of the Police Code.
B.29	4.7-3		mitigation: The Noise Ordinance states specific requirements for construction impact tools and times of construction by zoning district. These should be cited in summary, see Police Code Section 2907 (and 2908 if evening work is planned).
B.30	4.9-5	6	It is stated that it is "anticipated" that bolts in the BART tunnels will need to be replaced. It should

			be clarified as to how this decision would be made and/or implemented.
B.31	4.12-2	2	In the same vein as the prior comment, it states that "consideration should be given" to ground water monitoring." It should be clarified as to how this decision would be made and/or implemented.
B.32	4.13-1	4	The Belt Line railroad "may have to be relocated" to enable construction of the turnaround. Has this potential cost been considered in the turnaround analysis and would that relocation be implemented as part of this project?
B.33	4.13-1,2	7	While there are several references to Determinations of Eligibility, it is not clear what the practical implications of this determination are. These should be stated.
B.34	4.14-3	2	Can the operation of the exhaust fan be timed for the least possible impact on park users?

Chapter 5

B.35	5-3	3	The Surface Alternative is likely to have higher long term mitigation costs as it has more long term impacts. Are the costs for the mitigation measures included in the cost estimates? If not, they should be added and that data recalculated and reprinted for use by decision-makers. If so, please provide more detail so those costs can be separately identified. This point should also be clarified in Section 4.3.

Should any questions arise, please feel free to call Jim McCormick at 558-6394 or Rebecca Kohlstrand at 558-6296 for assistance.

Sincerely,

Rebecca Kohlstrand (for Dean Macris)

Dean L. Macris
Director of Planning

✓cc: Merrill Cohn, UEB

RLK:216

COMMENT C

City and County of San Francisco Department of Public Health

September 20, 1988

Merrill R. Cohn
Project Manager
Utilities Engineering Bureau
1155 Market Street
San Francisco, CA 94103

Re: Project M-501 Muni Metro Turnaround
Revised Site History Report

Dear Mr. Cohn:

C.1 I have completed the review of the materials submitted by you on June 2, 1988 with regards to the above referenced project. THe Site History has been found to satisfy the requirements for the Site History as set forth in Department of Public Works' ordinance #253-86.

Please find the attached copies of the following:

1. Required Chemical Tests and Test Methods,
2. Chain of Custody Form,
3. DRAFT SOP with regards to the SOILS ANALYSIS AND
4. DRAFT SOP with regards to the SITE MITIGATION REPORT and CERTIFICATION.

If you should have any questions regarding any of the above, do not hesitate to call me at 554-2792.

Very truly yours,

Pamela W Hollis

Pamela W. Hollis
Environmental Health Inspector
BEHS/TCMP

5886t

Central Office 101 Grove Street San Francisco, CA 94102

MAHER ORL .NCE
REQUIRED CHEMICAL TESTS AND TEST METHODS

CHEMICAL	ANALYTICAL METHOD(S)				STANDARDS		COMMENTS
					STLC(mg/l)	TTLC(mg/kg)	
INORGANICS							
Antimony/cmpd	EPA 6010 7040/1	EPA 3010,3020,3030,3040,3050,& (20=FAAS),(30/40=oil contm wsts) (50=sludge),(AA)			15	500	EPA 6010 = CAM; FAAS=flame atomic absorption spectrophotometry, AA=atomic absorption(DA,F)
Arsenic/cmpd	EPA 6010	EPA 7060/1(AA)		7000 sers	5	500	Water std: 0.05 mg/l; sers=series
Asbestos	EPA 600/M4-82-020	microscopy			-	1.0	as percent
Barium/cmpd	EPA 6010	EPA 7080/1(AA)		7000 sers	100	10,000*	Water std: 1 mg/l
*excluding Barium Sulfate							
Beryllium/cmpd	EPA 6010				0.75	75	
Cadmium/cmpd	EPA 6010	EPA 7130/1(AA)		7000 sers	1	100	Water std: 0.010 mg/l
Chromium(VI)cmpd	EPA 6010	EPA 7190/1(AA)	EPA 7195/6/7		5	500	Water std: 00.05 mg/l (EPA 3060-extraction) (5=coprecipitation,6=colorimetric,7=chelatn) (EPA 7190 sers subj to interfs in soil)
Chromium/(III)cmpd	EPA 6010	EPA 7190/1(AA)		7000 sers	560	2,500	
Cobalt/cmpd	EPA 6010				80	8,000	
Copper/cmpd	EPA 6010	EPA 7210		7000 sers	25	2,500	
Flouride salts		EPA 340.2			180	18,000	
Lead/cmpd	EPA 6010	EPA 7420/1(AA)		7000 sers	5	1,000	Water std: 0.05 mg/l
Mercury/cmpd	EPA 6010	EPA 7471(CV in ss & solids)			0.2	20	Water std: 0.002 mg/l; CV=cold vapor
Molybdenum/cmpd	EPA 6010				350	3,500	
Nickel/cmpd	EPA 6010	EPA 7520/1(AA)		7000 sers	20	2,000	
Selenium//cmpd	EPA 6010	EPA 7740/1(AA)			1	100	Water std: 0.01 mg/l
Silver/cmpd	EPA 6010	EPA 7760/1(AA)			5	500	Water std: 0.05 mg/l
Thallium/cmpd	EPA 6010				7	700	
Vanadium/cmpd	EPA 6010				24	2,400	
Zinc/cmpd	EPA 6010				250	5,000	
VOLATILE ORGANICS							
acrolein	EPA 8240			EPA 8030			
acrylonitrile	EPA 8240			EPA 8030			
benzene	EPA 8240		EPA 8020				
bromoform	EPA 8240	EPA 8010					
carbon tetrachloride	EPA 8240	EPA 8010	EPA 8020				
chlorobenzene	EPA 8240	EPA 8010					

50551-1

SAMPLER:
Name: ______________________
Address: ______________________
Phone #: ______________________

SHIPPER:
Name: ______________________
Address: ______________________
Phone #: ______________________

RECEIVER / LABORATORY:
Name: ______________________
Address: ______________________
Phone #: ______________________

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CON-TAINERS
SAMPLERS: *(Signature)*		

TEST METHODS FOR CHEMICAL ANALYSES

STA. NO.	DATE	TIME	COMP.	Disc.	S / W	STATION LOCATION	NO. OF CON-TAINERS								REMARKS

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

DRAFT

SOILS ANALYSIS

f. When a Soils Analysis Report is required, the applicant must address all of the following:

- Currently, it is DPW/DPH policy that any site requiring a Site History must also conduct a soil analysis study and submit a report detailing their findings.
- Some submittals include a Site History and a proposed Soil Sampling Plan. Where that is the case, items 1) through 9) needs to be addressed.

1) All required chemicals are analyzed for in the stated test methods.

   - Using the Chemical Checklist Form [5336t], review the Soils Analysis Report for complete coverage of the required chemicals.
   - Comparision of the proposed test method(s) may need to be made to the test methods chart (form 4993t) or additional research may be required.
   - Additional research includes, but is not limited to, the following:
     - ° reviewing stated test method(s) for appropriate chemical testing,
     - ° obtaining copies of EPA test methods from the EPA library, phone # 974-8076 ,etc.

2) Any other chemicals identified through the Site History are also analyzed for in the stated test methods.
3) A description of the test methods used.
4) The name of the State certified laboratory designated as being responsible for running the correct tests.

   a) Check the State laboratory certification list for the designated lab,
   b) Obtain certification status of the designated lab from HML, phone # 540-3003 , if not on the State list.

5) Correct sampling and preservation techniques are used to collect the required samples.

   - When sampling the soil for volatile chemicals, containers must be brass or stainless steel tubes with foil and teflon coated end caps.
   - Samples should be taped and placed immediately on ice for timely transport to the designated State certified lab.

6) Type of samples taken are indicated, e.g. discrete vs. composite sampling, where and how many are composited, etc.

   - Composite samples can be mixed with no more than three(3)depths from within the same soil boring. AND
   - Any and all compositing is to be done by the designated State certified lab using EPA method_________.

SOILS ANALYSIS(cont.)

7) Soil borings are to the depth of the proposed excavation and an adequate number of samples are obtained throughout the boring length.

- Sampling is required in those areas proposed for excavation and to the depth of excavation.
- Distances between sampled core areas are site and depth specific.
- Generally, samples within an individual boring have been taken ~ 3-5 feet apart, e.g. in a 12 foot soil boring, sampling could be taken at 1',4',8', & 12' or 1',6', & 12'.

NOTE: Spatial distribution and density of sampling points are not addressed by DPH due to liability concerns. Sampling points must be based on the consultants expertise and judgement. Factors to be considered include:

- ° historical land use,
- ° the proximity of potential hazardous waste(s) to the excavation, and
- ° random numerical sampling to accomplish a confidence range of 80-100%.

For those projects which are basically linear in form, e.g. sewer lines, gas or water lines, etc, a minimum of one(1) bore for every 250 feet has been found to be acceptable, if no other potential hazardous waste sites have been identified along the excavation route.

8) Chain of custody records were included. (See Example 2)

9) Lab data results were included for documentation purposes.

- Review is needed to determine if there is any discrepancy between amounts stated in the report and lab documents.

10) An accurate plot map is provided indicating test bore locations.
11) The results of the analysis is included along with a comparision of known State standards made with the contaminants found.
12) A copy of the accompanying cover letter to State agencies is included, indicating:

- ° which State agency the report was mailed to for review and the date of mailing,
- ° The date of the report sent,
- ° that the soils analysis was submitted to them for their information, and
- ° that those contaminants found to be at hazardous wastes levels have been especially noted.

13) Conclusions regarding the above comparision(s) have been made by the soil analysis report preparer.

14) The following statement has been included:

SOILS ANALYSIS(cont.)

> "The site is/is not on the National Priorities List or the list of hazardous substances release sites published by the California Department of Health Services."

15) The following statement is included:

> "This soils analysis is representative of the soil conditions likely to be found during excavation on this site."

16) The report is signed by the soils analysis report preparer and includes his/her certification and certification number.

    - Soil analysis report preparer is normally the person who also took the samples.
    - If two different persons are responsible for the actual sampling and the report preparation, then both persons need to sign the report and provide their certification and certification numbers.

- Log in the appropriate information on Time Tracking Form 5262t after the review of the Soils Analysis report has been approved.

g. When the Soils Analysis report is approved, no hazardous wastes have been found, and the site is not listed on either of the State or Federal Superfund lists; fill in the appropriate portions of the SHA Response Letter [4081t].

- Approval is based on the completion of all the foregoing section f, steps 1 through 16.

1) Attach the completed form to the outside of the file folder and place in TCMP Manager's mailbox for review and signature.

2) When the file and signed form has been returned, make two(2) copies of the form.
3) Prepare an invoice (Invoice Form [5355t]) listing times and costs from the Time Tracking Form [5262t].
4) Phone the applicant and notify him/her of the pending approved status of their Soil Analysis Report and the amount due for time(s) spent.

    - Notify them of the mailing of the written statement (invoice 5355t) AND
    - the need for payment before DPH can complete the approval of the Soil Analysis Report.

5) Upon receipt of the check for the amount due;

    - stamp the invoice paid,
    - log in the date received on the Mgmt Tracking Form [5319t], AND
    - issue the receipt (as outlined in step 4.a-j, pg 2) and place it in the file.

SOILS ANALYSIS(cont.)

6) Mail the original of the signed SHA Response Letter Form [4081t] (from step g.2) to the applicant and a copy to the Chief counter person at BBI; place a copy in the file.
7) Log in the mailing date on the appropriate line of the Mgmt Tracking Form [5319t].
8) The file is now complete.

h. When the Soils Analysis report is disapproved;

- Disapproval is based on any missing steps or information in any of the foregoing section ~~f~~ g, steps 1 through 16.

1) Phone the Soils Analysis report preparer/applicant and verbally notify them of the deficiencies. Log the phone conversation and agreement(s)/resolution(s) reached on Memo Form [2212t]. Also notify them of the possibility of the disapproval letter.

    - If the required information can be delivered to our office within a few days, the mailing of the disapproval letter can be delayed, pending review of the new information submitted.

    - If the additional information is not received in a timely manner or additional documentation is required, complete steps 2) through 6).

2) Complete the appropriate sections of SHA Response Letter Form [4081t] and denote those items missing and requiring additional information.
3) Attach the completed form to the outside of the file folder and place in TCMP Manager's mailbox for review and signature.
4) When the file and signed form is returned, make three(3) copies of the form.
5) Mail the original to the applicant, a copy to the soils analysis report preparer and Chief counter person at BBI Place and place a copy in the file
6) Log in the mailing date on the appropriate line of the Mgmt Tracking Form [5319t].

7) Review new submittals for site; if all requirements are met, no hazardous wastes have been found, and the site is not listed on either the State or Federal Superfund lists; reissue SHA Response Letter 4081t stating approval.
8) Repeat steps 3) through 4).
9) Prepare an invoice [5355t] listing times and costs from the Time Tracking Form [5262t].
10) Phone the applicant and notify him/her of the pending approved status of their Soil Analysis Report and the amount due for time(s) spent.

    - Notify them of the mailing of the written statement (invoice 5355t) AND
    - the need for payment before DPH can complete the approval of the Soil Analysis Report.

SOILS ANALYSIS(cont.)

11) Upon receipt of the check for the amount due;

    - stamp the invoice paid,
    - log in the date received on Mgmt Tracking Form [5319t],
      AND
    - issue the receipt (as outlined in step 4.a-j) and place it in the file.

12) Mail the original of the signed, approved SHA Response Letter Form [4081t] (from step h.8) to the applicant and a copy to the Chief counter person at BBI; place a copy in the file.

13) Log in the mailing date on the appropriate line of the Mgmt Tracking Form [5319t].

14) File is now complete.

SITE MITIGATION REPORT

i. When a Site Mitigation Report is required, the applicant must address the following:

- A Site Mitigation Report is required when:
  - the site is on either the State or Federal Superfund lists

    OR
  - the Soils Analysis Report is approved for completeness but hazardous wastes are present on the site

1) When the site is on either the State or Federal Superfund lists, the applicant shall provide certification or verification from the appropriate federal or state agency that any site mitigation required by them has been completed.

   a) Complete the certification process as outlined under section ~~i~~ j.

OR

2) When the site is not on either of the State or Federal Superfund lists, the applicant shall:

   a) Submit a site mitigation report prepared by a "qualified" person containing the following information:

      - A "qualified" person is defined as a person who is registered or certified by the State of California as a: soil engineer, civil engineer, chemical engineer, engineering geologist, geologist, hydrogeologist, industrial hygienist or environmental assessor.

   i A determination as to whether or not the hazardous wastes found in the soil are now causing or are likely to cause "significant harm" in the future.

      - Significant harm is defined as significant risks of exposure to the environment or health and safety.

   ii A recommendation for mitigation measures where potential harm is present and is likely to cause harm in the future.

   iii A program of soil sampling and analysis which will verify that mitigation is complete.

      - This program is to be carried out by the applicant at the completion of the mitigation measures.

   iv A signed statement by the site mitigation report preparer certifying the following:

      - that he/she is a qualified person AND
      - that in his/her judgement either no mitigation is required OR
      - the mitigation measures identified, if completed, will mitigate the significant environmental or health and safety risks.

SITE MITIGATION REPORT(cont.)

b) Complete the site mitigation measures as identified in the site mitigation report.

c) Complete the certification process as stated in section 1005 of the ordinance and outlined under section j.

CERTIFICATION

j. When certification is required, the applicant, under penalty of perjury, must submit a letter containing the following:

- Certification is required whenever hazardous waste(s) are found on the site and a Site Mitigation Report is required.

1) The determination by the qualified person within the site mitigation report that no hazardous wastes in the soil are causing or are likely to cause significant environmental or health and safety risks. Therefore, no mitigation measures are recommended.

OR

2) That he/she has performed all mitigation measures recommended in the site mitigation report and has verified that mitigation is complete by conducting follow-up soil sampling and analysis, where recommended.

OR

3) When the site is on the Federal or State Superfund lists, he/she has received certification or verification from the appropriate state or federal agency that mitigation is complete.

   a) He/she must submit copies of the state or federal agency verification.
   b) The state or federal agency verification shall constitute a conclusive determination and shall be binding upon DPH.

AND

4) The following declarations are included:

   - The applicant recognizes that it has a nondelegable duty to perform site mitigation;
   - that it, and not the City, is responsible for site mitigation;
   - that it, not the City, attests to and is responsible for the accuracy of the representations made in the certification;
   - and that it will continue to remain liable and reponsible, to the extent such liability or responsibility is imposed by state and federal law, for its failure to perform the site mitigation.

- Log in the appropriate information on the Time Tracking Form [5262t] after the review of the certification has been completed.

CERTIFICATION(cont.)

k. When the certification process is complete; provide a written response notifying DPW and the applicant of this fact.

1) Attach the completed response to the outside of the file folder and place it in TCMP Manager's mailbox for review and signature.
2) When the file and signed form has been returned, make two(2) copies of the form.
3) Prepare an invoice [5355t] listing times and costs from the Time Tracking Form [5262t].
4) Phone the applicant and notify him/her of the pending approved status of their certification and the amount due for time(s) spent.

   - Notify them of the mailing of the written statement (invoice 5355t) AND
   - the need for payment before DPH can complete the approval of the certification process.

5) Make one(1) copy of the invoice. Place one(1) copy in the file and mail the original to the applicant.
6) Log in the mailing date of the invoice on the appropriate line of the Mgmt Tracking Form [5319t].

7) Upon receipt of the check for the amount due;

   - stamp the invoice paid,
   - log in the date received on the Mgmt Tracking Form [5319t], AND
   - issue a receipt (as outlined in step 4.a-j, pg 2) and place it in the file.

8) Mail the original to the applicant and a copy to the Chief counter person at BBI and place a copy in the file.
9) Log in the mailing date on the appropriate line of the Mgmt Tracking Form [5319t].
10) The file is now complete.

l. When the certification process is not complete;

- The certification is not complete when any of the conditions or statements, as outlined in section ~~i~~ j, steps 1) & 4), 2) & 4) or 3) & 4), are missing.

1) Phone the applicant and verbally notify him/her of the certification's deficiencies. Log the phone conversation and agreement(s)/resolution(s) reached on Memo Form [2212t]. Also notify them of the possibility of the disapproval letter.

   - If required information can be delivered to our office within a few days, the mailing of the disapproval letter can be delayed, pending final review of the additional information.

CERTIFICATION(cont.)

- If the additional information is not received in a timely manner or additional documentation is required, complete steps 2) through 6).

2) Complete the written response delineating those items missing and requiring additional information.
3) Attach the completed response to the outside of the file folder and place in TCMP Manager's mailbox for review and signature.
4) When the file folder and signed form is returned, make two(2) copies of the form.
5) Mail the original to the applicant and a copy to the Chief counter person at BBI and place a copy in the file.
6) Log in the mailing date on the appropriate line of the Mgmt Tracking Form [5319t].

7) Review new submittals for site; if all requirements are met, provide a written response stating completeness.
8) Repeat steps 3) through 4).
9) Prepare an invoice [5355t] listing times and costs from the Time Tracking Form [5262t].
10) Phone the applicant and notify him/her of the pending approved status of their certification and the amount due for time(s) spent.

    - Notify them of the mailing of the written statement (invoice 5355t) AND
    - need for payment before DPH can complete the approval of the certification process.

11) Make one(1) copy of the invoice. Place one(1) copy in the file and mail the original to the applicant.
12) Log in the mailing date of the invoice on the appropriate line of the Mgmt Tracking Form [5319t].

13) Upon receipt of the check for the amount due;
    - stamp the invoice paid,
    - log in the date received on the Mgmt Tracking Form [5319t], AND
    - issue a receipt (as outlined in step 4.a-j, pg 2) and place it in the file.

14) Mail the original of the signed, approved written response to the applicant and a copy to the Chief counter person at BBI and place a copy in the file.

15) Log in the mailing date on the appropriate line of the Mgmt Tracking Form [5319t].

16) The file is now complete.

COMMENT D

City and County of San Francisco

Department of Public Works
Bureau of Engineering

October 7, 1988

Muni Metro Turnaround
EIS comment

Mr. Merrill Cohn
Project Manager
Public Utilities Commission
Utilities Engineering Bureau
1155 Market Street
San Francisco, CA 94103

Dear Mr. Cohn:

The Bureau of Engineering has been leading an urban design study for the following four projects: The Embarcadero Parkway (Surface Roadway), Muni Metro Turnaround, Muni Metro Extension and F-Line Historic Streetcar. The urban design study addressed conditions both if the surface turnback alternative were selected and if the underground turnback alternative were selected. The following comments compare the urban design impacts and opportunities for those two alternatives.

Comparison at Howard Street

D.1 Under the surface alignment alternative, proposed Metro tracks would reach surface level just north of Howard Street. Visibility of rail transit exiting the tunnel portal would be limited, and to reduce the potential for conflicts with autos, the median at Howard Street would be closed. Vehicles traveling eastbound on Howard would be prevented from turning northbound onto The Embarcadero. Vehicles traveling northbound on The Embarcadero would also be prevented from turning westbound onto Howard Street or making a U-turn. Northbound vehicular turns would need to occur at Mission or Bryant instead. The intersection would be realigned to allow pedestrians to cross The Embarcadero only on the south side of Howard Street, at least 200 feet from the tunnel portal to provide sight distance for rail operators. (Note that Figure 4.5-1 does not correctly show the portal location.) Although pedestrians will be directed away from track switches, there will still be three sets of tracks to cross, with signals and pedestrian separation devices. The tracks, stopped trains, and separation structures would impede visual access. Three sets of tracks may also mildly deter physical access. North of the intersection, the tunnel emerges from the ground and tracks reach grade just north of Howard Street. The walls of the structure may block views not obscured by the freeway columns.

The underground alignment would permit all vehicle and pedestrian movements to be accommodated at this location and would better connect land and water.

Comparison at Mission Street

D.2 For both alternatives, the Muni tunnel will be underground and conditions will be similar to today's. However, the surface alignment will result in much higher demands for turns from northbound The Embarcadero onto westbound Mission Street, necessitating two left turn bays to hold the full queue length.

Additionally, it's possible the capacity of Mission is not adequate to absorb the two turn lanes at all times, further increasing the queue length. Even without this project, this intersection will have a low level of service.

The underground alignment would distribute some of the turning movements to Howard Street.

Between Howard & Folsom Streets

D.3 In this stretch both alignments transition from the median of The Embarcadero to the eastern lanes of the current Steuart Street, which is to be widened and become the realigned Embarcadero Parkway. For the surface alternative, a center track for reversing a 4-car transit train would be provided in this block. While this maneuver occurs (every 3 to 5 minutes or so during rush hour), waterfront views will be blocked.

The underground alternative has its tunnel emerging and reaching grade in this block. The walls of the structure could block views at street level. Views northwest of this area are already blocked by freeway columns.

Comparison at Folsom Street

D.4 Under the surface alternative, eastbound traffic on Folsom Street would be allowed to turn both right and left onto The Embarcadero, crossing the median for turns northbound. Pedestrians would be directed to cross The Embarcadero only on the south side of Folsom, to avoid switches to the north. Northbound left turn queues would extend half a block on The Embarcadero.

Under the underground alternative, pedestrians would be allowed to cross both sides of the intersection and vehicles would be allowed to make all turns. The northbound left turn queue would be slightly shorter.

Between Folsom and Harrison Streets

D.5 In the surface alternative, trains stop at Hills Plaza, then continue south to the next block before encountering the next switching tracks.

In the underground alternative, a track would be provided for temporary holding of disabled trains. Open waterfront views would be blocked whenever a disabled train was there.

Comparison at Harrison Street

D.6 For the surface alternative, the median would be closed to turning vehicular traffic because otherwise the slow speed of transit trains reversing direction would block traffic. Turns from eastbound Harrison Street to The Embarcadero would be permitted and turns from southbound The Embarcadero to Harrison would be permitted. Because of restricted turns, truck access from Harrison to Pier 24/26 would have to be accomplished by turning south on Main Street, west at Bryant Street and then north onto The Embarcadero. Southbound trucks on The Embarcadero desiring access to Pier 24/26 would need to follow a similar route or make a U-turn at Bryant. Only two sets of tracks would need to be crossed by pedestrian crossings which would be provided, although transit efficiency could be impacted by these conflicts.

Although the underground alternative does not extend this far, the accompanying project, Muni Metro Extension, will provide northbound and southbound tracks through this intersection. All vehicle turns and U-turns would be accommodated under this alternative. Full pedestrian crossings would be provided.

Between Harrison and Bryant Streets

D.7 For the surface alignment, two center tracks would be provided. One for reversing a four-car transit train and one for temporary holding of a disabled train. Views of piers would be blocked any time a disabled transit train was there, and during reversal of trains.

The Muni Metro Extension in this stretch will have only northbound and southbound through tracks. Because the width of the median in this alternative is 18 feet less than the width needed for the surface alignment, approximately 18 feet of additional median, sidewalk, or promenade can be provided in this vicinity.

Comparison at Bryant Street

D.8 No matter which alternative is implemented, Bryant Street will be realigned on the axis of the entrance to Pier 30/32. In both cases, all vehicle turns, U-turns and pedestrian movements would be accommodated. Only two sets of tracks will continue through the intersection. Full truck access to Pier 30/32 will be provided.

Under the surface alternative, since left turns are not permitted at Harrison, a block-long northbound left turn queue is anticipated at Bryant.

A somewhat shorter left turn queue is anticipated for the underground alternative.

Belt Line Freight Track

There is difference between surface and underground alternatives in available
D.9 space for the Belt Line freight tracks south of Pier 30/32. Between Pier 30/32 and Pier 26, the surface alternative would necessitate placing freight tracks in one of the roadway lanes. This is incorrectly stated on Page 4.5-3. In either case, the Port staff believes that, if freight track is provided, placing the freight track in the roadway is reasonable, because of its limited use, which will be scheduled at night.

Very truly yours,

Frank H. Moss, Jr.
Deputy Director for
Engineering and City
Engineer